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WHOLE SERIES, VOL. XLI. No. 6. THIRD SERIES, VOL. XXXIII.

The THERAPEUTIC GAZETTE

INCORPORATING

MEDICINE [illegible] THE MEDICAL AGE

A Monthly Journal of

Practical Therapeutics

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EDITORIAL OFFICE, N. W. Cor. 18th and Spruce Streets, PHILADELPHIA, PA.

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United States and Mexico, one year, ...	Two Dollars.
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Foreign Countries (postage prepaid), one year, . . .	Ten Shillings.

E. G. SWIFT, Publisher, . . . DETROIT, MICHIGAN, U. S. A.

FOREIGN OFFICES:

LONDON, ENGLAND—19 & 20 Great Pulteney St., W. SYDNEY, N. S. W., AUSTRALIA—125 York St.
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MEDICINE AND THE MEDICAL AGE.

Whole Series, Vol. XLI. | DETROIT, MICH., JUNE 15, 1917. | Third Series, Vol. XXXIII, No. 6.

ORIGINAL COMMUNICATIONS.

ETIOLOGY AND DIAGNOSIS OF DISEASES OF THE ACCESSORY SINUSES FOLLOWING INFLUENZA.[1]

BY GEORGE MORRISON COATES, A.B., M.D., F.A.C.S.,

Surgeon Ear, Nose, and Throat Department, Pennsylvania Hospital; Professor of Diseases of the Ear, Philadelphia Polyclinic and College for Graduates in Medicine; Consulting Laryngologist, Philadelphia Orphanage and to Sharon Hospital, etc.

The etiology of all accessory sinus disease may be described under two heads, namely, the primary or exciting, and the secondary or contributing cause. The first factor is, then, the causative microörganism, and it might seem superfluous to speculate upon its nature, the title of this symposium being what it is, although in reality, from the loose association of the terms "grippe" and "influenza," there is some need for further study and clarity upon this point. If we understand by the term influenza only a disease caused by the influenza bacillus, there is of course no need to search further for our infecting organism. This organism indeed has always ranked high in the list of the causes of acute sinusitis, certain observers, such as Hájek, Zarnico, Lillienthal, Weichselbaum, Skillern, and others, placing its infective power about equally with the pneumococcus and streptococcus, and as the causative factor in about the same relative number of cases.

The terms influenza and grippe have become so confused in their application that they are often used indiscriminately, and but little attempt is made toward a differential diagnosis between these two conditions, although it is my belief that they are distinctly different. Influenza is, of course, caused by the influenza bacillus alone, while grippe, if we accept the term, should be applied to a pathological condition produced by certain other organisms, causing the various well-known symptoms that we are all familiar with. This disease, if it can be called a distinct disease, occurs in epidemics nearly every winter in this section of the country, giving symptoms that run the gamut from trivial ones, the so-called "grippy colds," to the serious ones that terminate in suppuration in the sinuses and middle ears, meningitis, brain abscess, pneumonia, nephritis, endocarditis, etc.

It is my belief that most of the epidemics we see are of this type, the difference in severity of various epidemics depending upon the different degrees of virulence of the causative organisms under different conditions. For instance, during the epidemic of the winter of 1915-16, which was described as an epidemic of influenza, cultures were obtained from thirty successive cases of different degrees of severity at the Pennsylvania Hospital, the majority of them showing the pneumococcus alone, in a few the streptococcus was present, while the bacillus influenzæ was not found once. That it played some part in the epidemic, however, may be inferred from the fact that it was discovered in pure culture in the cerebrospinal fluid of a case of meningitis of Drs. Stengle and Packard which ultimately made a recovery.

[1]Read by invitation as part of a symposium at the meeting of the Northern Medical Society of Philadelphia, March 9, 1917.

I should say, therefore, that unless a strict interpretation of the term influenza is demanded, the causative agent in these cases may be any of the common pus-producing organisms, headed by the three mentioned above.

Contributing causes are those which may put the mucous membrane lining of the sinuses in a condition susceptible to attack and infection. These are deviations of the septum, spurs and ridges, hypertrophies of the turbinates, hyperplasia of the mucous membrane of the nasal passages, polypoid degenerations from old infections, or any mechanical factor that may produce congestion of the sinus mucosa with inhibition of its usual ciliary action and bactericidal properties; occlusion of the ostia with resulting interference with drainage and ventilation, and retention of the products of inflammation. The normal sinus mucosa is probably frequently exposed to infection from the inspired air, but still the infective agents rarely obtain a foothold if the sinus is normal, being rapidly swept out through the ostia by the action of the cilia. It is only when this action is interfered with and frustrated that infection takes place.

Naturally the virulence of the infective agent plays a part, for if bacteria of a high degree of virulency are the invaders the infection is more likely to become firmly seated. It is probable that in every acute nasal infection some of the sinuses are involved, the ethmoid cells being, from their exposed position, the ones that usually suffer first. The influenzal or grippal infection causes an acute rhinitis with turgescence of the mucosa, congestion and edema of the lining membranes of the sinuses with inhibition of their functions, partial or complete occlusion of one or more ostia, rarefaction of the contained air through absorption of the oxygen content, and the soil is prepared for an acute suppuration within the cavity so affected. Even if no infection takes place, many of the symptoms of sinus disease are produced—tenderness, headache, and eye-ache especially. These disappear promptly when the ostium becomes liberated and the negative pressure is relieved. If this does not occur and infection follows, with accumulation of pus, the same symptoms appear, this time caused by positive pressure, and they are augmented by the absorption of toxins.

In the diagnosis of this condition, as in all others, the history, both past and present, may throw much light upon the subject. Frequently the patient has suffered from similar attacks in the past, often every winter, and sometimes several times during the season. These are usually cases of chronic sinus inflammation, showing acute exacerbations with each nasal infection. Moreover the patient is frequently sensitized to certain types of microörganisms, due in part to the chronic sinus inflammation. This history of the present attack will be that of influenza or grippe, or an acute "cold," with its well-known symptoms, but in an exaggerated form or a failure to convalesce at the proper time.

The period when the sinus or sinuses take part in the general infective process may be marked by a high degree of fever, although fever may be absent entirely; constipation, increased headache, sometimes more localized, more prostration. The fever is, as a rule, not high, 100° to 102° being, perhaps, the average. The headache is frequently general, dull and heavy or shooting and stabbing in type, intermittent at times, worse on bending the head downward, often worse in the early morning, clearing up more or less by noon. Headache, in acute sinusitis, may be said to be always present during some portion of the twenty-four hours.

The location of the headache cannot be depended upon to determine the particular cavity involved, although in a general way the inflammation of certain sinuses is more apt to give rise to headache in a certain location. Thus a dull pain between the eyes often denotes invasion of the anterior ethmoid cells; in the occiput and down the neck, the posterior ethmoids or the sphenoids; in the frontal or temporal regions, the frontals or maxillaries. The latter may cause toothache in either the

upper or lower jaws. It is evident, then, that the pain follows the distribution of the fifth nerve branches. A localized headache may be very misleading, however. If the sinus infection is unilateral, the headache is apt to correspond to the side of head affected. Stuffiness or occlusion of the nose is often complained of, accompanied by anosmia, as in most cases of acute rhinitis; mucopurulent discharge is more often present, although it may be absent. This discharge makes its appearance either at the anterior nares or drops into the nasopharynx, and each type has its diagnostic value.

Tenderness is a valuable diagnostic point, but in testing this, in a unilateral case, comparison must be made with the well side, since some individuals are abnormally sensitive to pressure over the sinuses, just as they often are over the mastoid processes. This symptom cannot be adduced in sphenoid or ethmoid disease, since these cavities are too remote from the surface. Rarely is it found over the antrum of Highmore. In the case of the frontal sinus it is of value if the pressure is made on the thin floor of the sinus above the inner canthus of the eye. Tenderness of the eyeballs to pressure is also worthy of note.

Examination of the nose frequently reveals the presence of muco-pus; if seen anteriorly and coming from beneath the middle turbinate, disease of some or all of the cells of the first series (anterior ethmoid, frontal and maxillary) is suspected. If, when this is wiped or washed away, more pus soon appears in the same locality, the diagnosis is assured. Pus flowing forward between the middle turbinate and the septum, or seen posteriorly by the mirror, suggests disease of the cells of the second series (the posterior ethmoids and the sphenoid). There may, however, be no pus evident, even in the presence of an empyema of some of the sinuses, due to occlusion of the ostia. In this case the application of the suction apparatus, after thorough shrinking of the mucous membrane around the ostia with cocaine and adrenalin, will probably cause it to make its appearance. Suction in the office is usually obtained by the use of an electric vacuum pump connected by rubber tubing with a glass nasal tip. This latter is placed in one side of the nose, and the patient instructed to say the letter K, which raises the soft palate and closes off the nasopharynx.

At the bedside where the electric pump is not available, a large metal syringe may be used to advantage, the piston being forcibly withdrawn when the K sound is made. Of course, great engorgement of the turbinates, especially in the regions of the sinus openings, is always a suspicious sign, even in the failure to obtain pus, for the headache may be of the vacuum variety. The employment of the nasopharyngoscope, an instrument built on the principle of the cystoscope, and for use in the nasal chamber, will at times reveal the presence of pus in the deeper portions of the nose where it might otherwise be overlooked.

Probing or washing a sinus, except in the case of the antrum, serves no useful purpose in acute sinus disease, the small diagnostic value it may have being more than offset by the traumatism caused and the subsequent swelling induced by its employment. In the case of the antrum it is different, for here the entrance is made by a small needle puncture beneath the inferior turbinate, causing little or no discomfort, and the subsequent washing through the hollow needle giving more information in regard to the condition of this sinus than all other means that can be employed. Transillumination of the antrum, when it is positive and when there is a distinct shadow on one side only, is a great help, but when negative cannot be relied on with certainty. This applies equally to the frontal sinus, the ethmoids and sphenoid being, of course, out of the question for this means of diagnosis because of their location. Due allowance, in the case of the frontals, must be made for thick bony walls and for sinuses of unequal size, which are the rule rather than the exception. The technique of obtaining radiographs has improved so vastly during the last few

years that a radiogram is now of great diagnostic value, but it must be properly interpreted, and even then is at times very misleading. The leucocyte count is usually not excessively high except in fulminating cases, although there may be a moderate degree of leucocytosis.

The title of the "Diagnosis of Sinus Disease following Influenza" seems to preclude the discussion of chronic sinus infection, but we must not forget that chronic sinusitis frequently has its origin in neglected acute cases of this type. The diagnosis differs in no essential points from the outline just given for the acute cases. I would like to say a few words, however, on the diagnosis of sinus disease, acute and chronic, in children. In young children the antrum is the only sinus well developed, and much doubt has been expressed as to the frequency of its infection. Coffin of New York has recently studied radiographically a large series of children in the Manhattan Hospital who exhibited chronic mucopurulent nasal discharges, and found that a large proportion of them showed shadowy antra by the ray. A corresponding series of children without that symptom was negative. This control test should certainly give us food for thought. It is at least certain that in children the maxillary sinus, and later the ethmoids, may be the seat of suppuration, and that this infection not infrequently makes its presence known by an orbital abscess, pointing near the inner canthus or above the infraorbital ridge, and that many cases showing mucopurulent discharge are in reality cases of sinus infection.

The diagnosis of acute sinusitis is usually not a difficult task for a competent rhinologist with proper instruments for examination, but without such a nasal examination it must be largely a matter of guesswork, albeit the guess may be a good one. It is a matter of gratification that the profession at large is keenly appreciative of the value of prompt diagnosis and treatment in these conditions and the dangers that lurk behind their neglect. I think the arrangement of this symposium by a society of this character is good evidence of this appreciation.

THE MEDICAL TREATMENT OF SINUS DISEASE.[1]

BY GEORGE B. WOOD, M.D.,
Laryngologist to Howard Hospital; Laryngologist to Orthopedic Hospital, Philadelphia.

Disease of the accessory sinuses of the nose, more particularly in its chronic form, is somewhat analogous to suppurative conditions in other portions of the body, yet it differs in one or two important points. While recognizing that the treatment of suppurative foci, no matter in what part of the body they are found, is essentially surgical, inflammatory conditions of the accessory sinuses, especially when acute, can be influenced by medicinal treatment because of the peculiar anatomy of the accessory sinuses. The accessory sinuses are noncollapsible cavities communicating with the outside atmosphere by natural ostii which open into the nasal fossæ, and are so placed that the swelling of the turbinal bodies may interfere more or less with their drainage. The essential point to remember is that these cavities when diseased are not as a rule closed areas of inflammation, but because of their natural openings can drain to a greater or less extent without operation, provided that the contents of the nasal fossæ are not in themselves obstructive. It is of course recognized that under certain conditions this drainage is not sufficient to permit the lining mucous membrane to spontaneously recover, and then it is that operative procedures must be undertaken.

Acute inflammatory disease of the accessory sinus rarely calls for surgery, whereas chronic empyema seldom recovers without surgical help. Occasionally we see an acute

[1]Read by invitation as part of a symposium at the meeting of the Northern Medical Society of Philadelphia, March 9, 1917.

sinusitis of such a severe type that rapid destruction not only of the soft parts but also of the bone takes place, and of course here operative interference is absolutely necessary; but in the large majority of acute cases minor surgical procedures such as the repeated puncture of the antrum, the removal of the anterior half of the middle turbinal, or the drilling of the sphenoidal cavities, are productive of more harm than good. I am convinced that frequently acute sinusitis has become subacute or even chronic from too much surgical interference. The devitalization of an inflamed mucosa by trauma, the difficulty of avoiding secondary infection, the filling of the cavity with blood-clots, and the possible lowering of the patient's general resistance by shock are cogent reasons why we should avoid unnecessary surgery.

It is difficult to formulate a general rule for the treatment of even acute accessory sinus disease, and this because of the variance of the severity of the infection, the difference in the behavior of the different accessory sinuses themselves, and the problem of the nasal drainage modified by the particular anatomy of the individual with whom we are dealing. Sinusitis as a complication of grippe or other serious systemic infections is of more serious import as a rule than that following a simple coryza. In those types complicating acute general infections confinement to bed is generally essential, while in the less severe infections more freedom is permissible. Sinusitis causes less pain and general disturbances in individuals where the openings of the accessory sinuses are larger and less obstructed by the turbinal bodies or by deflections of the nasal septum than where the openings are small and the natural drainage interfered with. When the symptoms of sinusitis are purely local without general disturbances I do not believe that any form of internal medication or general treatment is of much value, unless it has for its object local effect. If accompanying the sinus disease there is evidence of general systemic infection the conditions must be met with appropriate treatment. But where there is such general disturbance the sinusitis is almost always present as a complication or sequela, and only in rare instances does acute sinus infection, *per se*, give rise to much systemic intoxication.

GENERAL INDICATIONS.

There is no doubt that atropine is of distinct value in the serous stage of the disease. By checking secretions it materially aids the drainage not only from the nasal fossæ itself, but probably by lessening the edema of the lining mucosa of the sinus renders more patulous the internal aspect of the ostium. In chronic suppurative conditions of the nose it is of no value and perhaps harmful. Atropine should be given in small doses at frequent intervals until some dryness of the throat is noticed. When the secretions are very thick and tenacious potassium iodide in small doses is sometimes helpful in aiding drainage. Hexamethylenamine according to experimental evidence is not excreted in the nasal secretion, but clinically it does seem to exert a certain bactericidal power when given in large doses. If given in these large doses in the first twenty-four hours of the attack, this drug at times seems to abort the attack, but I have never seen a case in which any benefit was manifest when it was administered after the condition had existed a few days. The adult dose should consist of from 15 to 20 grains, given three times a day, accompanied by the ingestion of large quantities of water. If the drug is to be given in sufficient dosage to produce any effect on the nasal mucosa, a large amount of it is excreted by the kidneys, and unless we dilute it by producing polyuria there is grave danger of severe cystitis. Fortunately the cystitis clears up very rapidly on withdrawal of the drug and the drinking of large quantities of water. When necessary drugs to control pain are perfectly permissible, but in few cases is morphine necessary, because sinus headache usually comes on some time in the early morning, frequently after the patient has gotten out

of bed, and disappears in the late afternoon, so that the patient is free from pain during the night. This is especially true in the subsiding stages.

Local non-surgical treatment in acute sinusitis is of distinct value and has for its object the relief of pain and the promotion of better drainage from the nasal fossæ; also it aids in preventing extension of the disease to other sinuses and the possible infection of the Eustachian tube and middle ear. External applications of hot or cold help not only in the relief of pain, but materially aid in reducing congestion. In the early stages of the disease cold is more useful than heat in limiting and keeping down the edema, and in some persons gives more relief than heat. Quite frequently, however, the cold seems to increase the headache, though occasionally it acts almost miraculously in the relief which it brings. If continuous cold is required the ice-cap is the best form by which to administer it, but where it can be properly administered the ice compress is probably more efficacious and less disagreeable to the patient. In the same way the hot-water bag is more easily used but probably less efficient than moist heat. The latter can be easily applied by wringing a large towel out of hot water and repeatedly applying it to the face and head.

The local internal medication of the nose has for its prime object the shrinking of the turbinal bodies. Even temporary contraction is of distinct value, as the drainage which can then take place tends to lessen the congestion and edema within the sinus cavities. For this purpose cocaine will be found to be the most efficient drug, but it should be only applied by physicians, and then not promiscuously to the whole of the mucous membrane, but in a fairly strong solution, say 10 per cent, by means of the cotton applicator directly to the region surrounding the ostium of the sinus involved. This application, however, should be done exceedingly carefully so as to avoid bruising of the tissues in the immediate neighborhood of the sinus opening.

Strong solutions of adrenalin should be absolutely avoided, as the relaxation which sometimes follows this application is so intense as to produce an absolute blockage of the whole nasal cavity for twelve hours or more. In a well-diluted solution it can be used by the patient at home where there is continued engorgement of the turbinal bodies. I am in the habit of prescribing some such solution as the following: Antipyrin 6 grains, 1:1000 adrenalin chloride solution ½ drachm, and enough water to make one ounce; 5 to 10 drops of this mixture can be instilled into the nose by the patient at home every six hours without danger of causing any excessive reaction. The position when applying the drops is important, as it is usually necessary to get the solution toward the upper part of the nose. This can be accomplished by having the patient lean his head backward over the edge of the bed until the top of the head is directed toward the floor. The solution of course may be used in an atomizer if preferred. Promiscuous douching of the nose during acute rhinitis or accessory sinus disease should not be permitted, though the physician may at times find it necessary to use a little warm boric acid or normal salt solution to remove from the floor of the nose stagnated or partially dried accessory sinus pus. The mucosa of the nose should be carefully protected and soothed by the frequent application of a non-irritant oily medication, used either by medicine-dropper or atomizer.

Sometimes when the anatomy of the nose permits I have experienced a great temptation to wash out the cavities through the normal openings, but have not been able to convince myself that this procedure ever hastens the desired end. Again, in acute antral suppuration where there is great pain one is sometimes strongly tempted to puncture the antrum, hoping thereby to relieve the internal pressure. It must be remembered, however, that in the early stages the pressure is due to the edema of the mucosa as well as to the accumulation of serum, so that the point of the entering needle may not reach the free fluid at all, but simply

leads the injected fluid into the already serous-soaked mucosa. It would seem to be better treatment in these cases, in which the ordinary less radical measures fail to give relief, to go the limit and remove the anterior end of the inferior and make a sufficiently large opening through the bony wall into the antrum to permit of good drainage. The same thing holds true in acute suppuration of the sphenoidal sinus. When the disease has lasted long enough so that the condition approaches the subacute type, lavage of the cavities is probably a very useful procedure even if a small amount of trauma is necessary to gain access to the cavity.

As I said before, the treatment of chronic accessory sinus disease is surgical, and medical applications are used in a purely supplementary manner, but may be important adjuncts. The injection of alcohol into an accessory sinus cavity is not an extremely painful procedure and greatly helps in its sterilization. Argyrol used in the same manner has about its only use in the whole field of nose and throat disease, but even then is not as efficacious as alcohol. Alcohol should be used at first in a 50-per-cent solution and the strength of it increased as the tolerance of the patient permits. The antrum is about the only cavity in which this method of treatment can be utilized. Injections of bismuth paste have in some hands given very good results. This is especially true of the frontal sinus, where it has been used after the frontal duct has been enlarged by some surgical procedure. Where the opening of the cavity attained by operation is blocked by granulation tissue various caustics are necessary, and the best of these I find to be trichloracetic acid. Its action is very rapid, almost painless, and easily controlled by the subsequent instillation of normal salt solution. Nitrate of silver in strong solution may be used for the same purpose, but it is not sufficiently caustic to be of great value. A chromic acid bead is also useful, more particularly where a small circumscribed area needs to be destroyed.

Vaccine therapy is of doubtful value in accessory sinus disease. In the acute conditions it is useless and may be actually harmful. It may be tried if desired in the more chronic cases, especially those which refuse to yield to radical operations or when the patient shrinks from operative interference. The chief difficulty with the use of vaccine in nasal conditions is that a true specific autogenous vaccine is very difficult to obtain. In making the culture one must be very careful to avoid contamination from the nostril, and this is almost impossible unless some special method is adopted to prevent it. Again, even when the pus has been obtained directly from the sinus without contamination, it is sometimes difficult to obtain a culture from it, and I have in several instances failed to find organisms even after most careful culturing by an expert bacteriologist.

If a vaccine is used it should be an autogenous one, as the promiscuous shotgun therapy of stock vaccine is not scientific and therefore to be deprecated, and it has not yet been shown that the injection of dead bacteria is without danger. As a prophylactic measure to prevent recurrence of sinusitis the use of vaccines can be tried, and will probably be of as much use as when they are employed to prevent the ordinary infection of the upper respiratory tract. If some particular organism such as the micrococcus catarrhalis can be isolated from the secretions of the individual suffering from recurrent attacks, it would seem plausible to try the autogenous vaccine. However, we must tell our patients that this organism is not the only one that can infect the upper respiratory tract, and hence we cannot promise an absence of further infection.

In closing I want to lay particular emphasis on this thought: Careful and appropriate treatment of acute accessory sinus infection will greatly lessen the number of cases of chronic disease, and this treatment in the large majority of cases is essentially non-surgical.

A SIMPLIFIED TECHNIQUE IN TUBERCULIN ADMINISTRATION.[1]

BY ELLIS BONIME, M.D.,

Adjunct Professor Immunotherapy Division of Surgical Department, New York Polyclinic Medical School and Hospital.

Owing to the wide spread of the infection with the tubercle bacillus, I have long been convinced that the value of such remedies as we have can be of little importance unless they can be placed in the hands of the intelligent general practitioner.

Again, if we are to possess an effective remedy, that remedy should be applicable to ambulatory patients, and administerable without the necessity of taking them from their employment. The medical profession is beginning to realize more and more forcibly that the vast number of patients suffering from tuberculosis have not yet come for diagnosis and assistance; that these, being undiscovered, offer the greatest danger to the community. Without such a remedy we cannot hope to attract these patients to seek aid in the early stages of the infection, for at present there exists a subconscious fear of a diagnosis of tuberculosis, based upon the fact that to most people such a diagnosis means a sacrifice of the employment which is the only source of support for the sufferer and his family. Indeed, I have known many to avoid diagnosis for no more plausible a reason than that they were unwilling to be separated from their favorite mode of life.

Accordingly, all such patients will nurse themselves into the belief that they are not tubercular; and do not approach the physician until driven there by considerable extension of their disease. It is therefore evident that with the prospect of a remedy that can be administered by the physician during periodic visits to his office, a vast number of patients will come for aid at the stage where aid is most efficacious.

Such a remedy may be found in tuberculin. It is no longer doubted anywhere that tuberculin possesses the power to elicit an immune response. And possessing this virtue, it must be recognized as the only certain remedy in this infection. What then is it that has made the administration of tuberculin so dangerous and so difficult? We know that tuberculin *per se* is not poisonous, for it can be given to healthy individuals without producing constitutional symptoms; also if administered to an individual in the last stage of tuberculosis, in whom the immune response no longer exists, it produces no constitutional symptoms. It is therefore necessary for an immune response to occur before tuberculin can prove poisonous. It is not yet certain how this immune response produces the poison, but the most plausible and most generally accepted theoretical explanation is that the antibody in combination with the tubercle bacillus forms in itself the protein poison, or forms the poison as a by-product of the biochemical combination between the antibody and the tubercle bacillus.

Thus it is that the very protective mechanism in the tubercular infection produces a resultant poisonous product. This in its action produces the hypersusceptibility existing in tubercular individuals, which when increased by the production of this poison lowers the resistance to the infection. It thus allows the spread of disease during the period of the constitutional symptoms produced by the poison. This spread is such that it even more than offsets the amount of protection gained by the immune response. The amount of increased hypersusceptibility is in proportion to the amount of poison produced, which in its turn depends upon the number of tubercle bacilli killed during the immune response.

It is the difficulty in gauging the amount of immune response produced, so as to bring about a maximum effect with a minimum amount of resultant poison, that stands in the way of the general use of tuberculin, and which has limited its use to the present time very severely to the specialist.

[1]Read before the New York County Medical Society, April 20, 1917.

Several schemes of dosage were devised in various parts of the world which proved very efficacious in the hands of the expert. However, all depended so much upon the judgment of the amount of hypersusceptibility of each individual case, that their favorable reports regarding the efficacy of tuberculin failed to place the remedy within the reach of the vast majority of the afflicted.

I have obtained my experience with tuberculin largely in ambulatory cases, and am convinced of its far-reaching effects if it could be administered with safety by the intelligent general practitioner. So I have endeavored to devise a simple method of tuberculin administration which retains the principal elements necessary for its therapeutic effect; and I have finally succeeded in elaborating the method that I am here to explain. Before going into details as to the technique, I wish to say a word or two about the choice of tuberculin and the method of making dilutions.

The scope of this paper does not permit of discussion as to the relative value of the various kinds of tuberculin. To my mind, the greatest value can be derived from long practice in the use of one tuberculin and making it applicable to exceptional cases, rather than endeavoring to find a tuberculin to fit each particular case. However, we must bear in mind that there are two varieties of tuberculin: the tuberculin containing the exotoxins as exemplified by Old Tuberculin, and the tuberculin containing the endotoxins as found in the bacillary bodies and as exemplified by Bacillary Emulsion. All others are either different strengths of either of these or are mixtures of the two in varying proportions. It seems that those elements causing focal reaction are more pronounced in the tuberculins, as represented by O. T., and are therefore better used for treatment in general. The tuberculins of which B. E. is a type seem to have a preponderance of antibody-producing substances, and hence would seem to produce greater constitutional reactions. It is therefore logical to use bacillary emulsion at the conclusion of treatment when reactions are no longer to be feared, and where the bacillary immunity would seem to exert its greatest benefit.

In making dilutions, simplicity is the aim, since our purpose is to spread the use of tuberculin. I believe that the directions for making dilutions have been unnecessarily complicated and formed a prominent factor in limiting the use of tuberculin. Using as diluent one-half-per-cent phenol in normal saline, with the same tuberculin syringe that we use in treatment, we make five dilutions of the original tuberculin. In rare instances a sixth is necessary. Five small containers, labeled I, II, III, IV, and V, are sterilized ready to receive the dilutions.

By drawing 0.9 Cc. of the diluent into the syringe, followed by 0.1 Cc. of tuberculin, the first dilution is made and placed in the container marked I.

By drawing 0.9 Cc. of the diluent into the syringe, followed by 0.1 Cc. of dilution I, the second dilution is made and placed in the container marked II.

By drawing 0.9 Cc. of the diluent into the syringe, followed by 0.1 Cc. of dilution II, the third dilution is made and placed in the container marked III.

By drawing 0.9 Cc. of the diluent into the syringe, followed by 0.1 Cc. of dilution III, the fourth dilution is made and placed in the container marked IV.

By drawing 0.9 Cc. of the diluent into the syringe, followed by 0.1 Cc. of dilution IV, the fifth dilution is made and placed in the container marked V.

If a sixth is necessary, 0.9 Cc. of diluent plus 0.1 Cc. of the fifth dilution will make the sixth dilution. In that way:

Dilution No.	Strength of dilution.	Pure Tuberculin in each Cc. of dilution.
I	contains 1 in 10	or 0.1 Cc. or 100 c.mm.
II	contains 1 in 100	or 0.01 or 10 c.mm.
III	contains 1 in 1000	or 0.001 or 1 c.mm.
IV	contains 1 in 10000	or 0.0001 or 0.1 c.mm.
V	contains 1 in 100000	or 0.00001 or 0.01 c.mm.
VI	contains 1 in 1000000	or 0.000001 or 0.001 c.mm.

Before going into a detailed description of the simplified technique for tuberculin administration, I wish to call attention to

the following principles involved in the physiological action of tuberculin:

1. In order to produce a sufficient immunity by successive immune responses, we must gain a tolerance for the protein poison for which the individual possesses a hypersusceptibility.

2. We must produce the maximum amount of immune response with each inoculation of tuberculin, falling short of the production of sufficient poison to cause a constitutional reaction.

3. To produce complete tolerance—in other words, to overcome the hypersusceptibility—we must keep within the maximum amount of tolerance of each individual by increasing the dose by an amount sufficient to offset the amount of tolerance gained by each previous dose.

4. To make certain that we are keeping within the maximum amount of tolerance during the treatment, a constitutional reaction must be produced at long intervals. If such reaction be mild, the clue it gives to the relation between dosage and the amount of tolerance will more than offset any temporary harm that it may produce.

5. Such a constitutional reaction, however mild, loses for the patient a certain amount of gained tolerance, and temporarily increases the hypersusceptibility, requiring a decrease in the following dose.

I have endeavored to incorporate these principles in this system of dosage. It begins with an amount of tuberculin less than will produce a reaction. This dose is subsequently increased by a definite but very small amount, and the amount of increase also increased by a very small amount and at regular intervals. The amount of dose increase is only sufficient to control the amount of tolerance gained by the preceding doses. And the amount of the increase of the increase will control the difference between the amount of tuberculin administered and the maximum amount the individual can tolerate. The progressively larger increase in the dose thus brought about will eventually produce a constitutional reaction. This reaction will necessarily be mild, as it is produced by the smallest amount of tuberculin required to produce such a reaction in that individual. By increasing the intervals after such reaction, and decreasing the dose by a small amount (thus offsetting the decreased tolerance produced by the reaction), we are certain that we are using a quantity of tuberculin coinciding with the maximum of tolerance of the individual, or that dosage which alone will produce the ideal therapeutic effect.

This full therapeutic effect can be kept up with but a slight increase during the next few treatments—that is, it is sufficient to begin with the same amount of increase as at the beginning of treatment. And in order to make certain that we shall not fall behind with the maximum effect, we continue by increasing the increase in the same manner as before. A second and even a third reaction may thus be produced during a course of treatment; but since these reactions are necessarily mild, this constant keeping at the maximum level of tolerance which this method of dosage entails must produce a continued maximum therapeutic effect.

Tuberculin injections should be given twice weekly. The new increase may be made on the day following the longer of the two intervals that occur in the week. A local reaction persisting at the time when the next treatment is due should indicate a postponement of the next treatment—making the interval a week. However, if the local reaction still persists beyond a week, it need not be regarded as of further significance as far as the continuation of the treatment is concerned. In fact, a local reaction need not at any time indicate a lessening of the dose.

In concluding treatment it is advisable in a great many cases, especially in bone and joint disease, to produce a bacillary immunity before we discharge the patient; and we do so by inoculating with B. E. once a week, beginning with the first dilution and either administering it as No. I of O. T. is administered (see chart), or by increas-

THE SIMPLIFIED TECHNIQUE OF TUBERCULIN ADMINISTRATION.

Administration of O. T.

Date 1916			No. Sol.	Quant. Cc.	Reaction Loc.	Reaction Temp.	
Jan.	1	1	V	0.10¶	0	0	
	5	2		0.12			+ 0.02 "
	8	3		0.14			
	12	4		0.18			+ 0.04 "
	15	5		0.22			
	19	6		0.28			+ 0.06 "
	22	7		0.34			
	26	8		0.42			+ 0.08 "
	29	9		0.50			
Feb.	2	10		0.60			+ 0.10 "
	5	11		0.70			
	9	12		0.82			+ 0.12
	12	13	IV	0.10			
	16	14		0.12			+ 0.02 "
	19	15		0.14			
	23	16		0.18			+ 0.04 "
	26	17		0.22			
Mar.	1	18		0.28			+ 0.06 "
	4	19		0.34			
	8	20		0.42			+ 0.08 "
	11	21		0.50			
	15	22		0.60			+ 0.10 "
	18	23		0.70			
	22	24		0.82			+ 0.12
	25	25	III	0.10			
	29	26		0.12			+ 0.02 "
Apr.	1	27		0.14			
	5	28		0.18			+ 0.04 "
	8	29		0.22			
	12	30		0.28			+ 0.06 "
	15	31		0.34			
	19	32		0.42			+ 0.08 "
	22	33		0.50			
	26	34		0.60			+ 0.10 "
	29	35		0.70			
May	3	36		0.82			+ 0.12
	6	37	II	0.10			
	10	38		0.12			+ 0.02 "
	13	39		0.14			
	17	40		0.18			+ 0.04 "
	20	41		0.22			
	24	42		0.28			+ 0.06 "
	27	43		0.34			
	31	44		0.42			+ 0.08 "
June	3	45		0.50			
	7	46		0.60			+ 0.10 "
	10	47		0.70			
	14	48		0.82			+ 0.12
	17	49	I	0.10			
	21	50		0.12			+ 0.02
	24	51		0.16			+ 0.04
	28	52		0.22			+ 0.06
July	1	53		0.30			+ 0.08
	5	54		0.40			+ 0.10
	8	55		0.52			+ 0.12
	12	56		0.66			+ 0.14
	15	57		0.82			+ 0.16
	19	58	O. T.	0.10			
	26	59		0.20			

Double the dose one week after the final dose as a test. If a reaction occurs after this test, give No. I over again, beginning one week after the reaction.

*Feb.	19	15	IV	0.14	+++	0	+ 0.02
	26	16		0.18	++	"	+ 0.04
Mar.	4	17		0.22	+	"	"
	8	18		0.28	0	"	+ 0.06
	11	19		0.34	"	"	"
‡	15	20		0.42	++	101	+ 0.08
	22	21		0.28	0	0	
	25	22		0.30	"	"	+ 0.02
	29	23		0.32	"	"	"
Apr.	1	24		0.36	"	"	+ 0.04
	etc.			etc.			etc.

B. E. Administration.

Administer B. E. after a completed course of O. T. by beginning with 0.10 Cc. of No. I dilution of B. E. (10% product which contains 5 mgr. per Cc.) and continuing with an increase of 0.10 Cc. at weekly intervals until a tenth Cc. of pure B. E. is reached. Then proceed by an increase of 0.02 Cc. of pure B. E. until a dose of 0.30 Cc. B. E. pure is reached.

¶If reaction occurs after first dose, begin, after one week's interval, with the next dilution, in this case No. IV.

*Treatment after a local reaction without a constitutional reaction.

‡Treatment following a constitutional reaction.

ing the dose by 0.1 Cc. until 0.20 Cc. of pure B. E. has been reached.

In tuberculosis, as in syphilis, it is difficult to determine just when the disease is totally eradicated. A negative complement fixation test of the blood in both syphilis and tuberculosis merely indicates a temporary excess of elements of resistance over the elements of disease. In syphilis the complement fixation test is applied at intervals for a period of time after an arbitrary conclusion of treatment in order to determine the possibility of a recurrence. It therefore occurred to me some years ago to apply the subcutaneous tuberculin test at three-month intervals following the conclusion of treatment for a possible return of hypersusceptibility. For experience has shown that hypersusceptibility precedes the recurrence of disease. The test consists of the inoculation of 0.01 Cc. of O. T. If that proves negative, a second test is administered a week later by giving 0.1 Cc. of O. T. If a constitutional reaction occurs after the first test, a course of tuberculin treatment is instituted, beginning with dilution II. If, however, the first test proves negative, and the second positive, the tuberculin treatment, beginning with dilution I, is instituted.

The overcoming of hypersusceptibility in tuberculosis may be the key-stone to the conquest of the disease. Since we have come to appreciate the wide spread of this disease, and the natural immunity that the human race possesses against it, I cannot but conclude that those who finally succumb to the disease are those who have acquired the idiosyncrasy to the protein poison, or the hypersusceptibility, as it is termed, after an initial infection. By the use of tuberculin we can both detect that hypersusceptibility, and overcome it before a recurrence of the disease can take place. So I venture to express the hope that by the wider use of tuberculin as rendered possible by its adoption into general practice, we shall add that element which will render the final eradication of this dread disease possible.

24 East 48th Street.

THE BARANY REACTION AS AN AID IN DIAGNOSIS AND TREATMENT.[1]

BY FRANK R. STARKEY, M.D., DETROIT, MICHIGAN.

In bringing forward this subject I, of course, do not make any claims to originality, inasmuch as our knowledge of intracranial localization is by no means satisfactory, although von Monokow, Sherrington, Mills, Spiller, and others have to some degree pointed out to us the reasons for some of our errors in diagnosing the location of cerebral and cerebellar lesions. Their work has thrown doubt upon what we supposed to be our most fundamental truths concerning the upper motor pathway and has caused us to realize that our conceptions of what seemed to be most thoroughly proven facts must change in the light of progress. This work of these investigators is scarcely less disturbing than was the overthrow of our conceptions of what we supposed to be for all time settled, the indivisibility of the atom. Now, thanks to the Curies, we know the atom to be a highly complex body. Therefore, we should welcome any addition that may increase our precision in this direction and feel especially grateful to Barany. The fact that his researches have been deemed worthy the Nobel prize gives them an added dignity.

While we should not be stinting in our praise of Barany as a pathfinder, we must not forget that to the indefatigable work of Dr. Isaac Jones of Philadelphia, under the supervision of Drs. Charles K. Mills and William G. Spiller, we owe most of the exact knowledge that we now possess concerning the pathways by which we trace these vestibular phenomena and make them useful in localizing lesions.

The Barany reaction cannot by any means be considered infallible, but I believe that when fully understood and carefully worked out it will prove an additional link in our chain of diagnostic aids, which must be considered as we do the Wassermann and other modern tests, not singly but as a part of an entire complex, before we attempt to pass judgment.

[1]Read before Wayne County Medical Society, Detroit, January 15, 1917.

Before accepting these findings we should make repeated examinations and should then not allow our enthusiasm to carry us astray, but always be conservative.

The Barany reaction is based upon certain fundamental facts that have been given us by the zoölogists in experiments with certain mollusks and crustacea, the clam and the lobster in particular. It has been proven and is easily demonstrable that the clam and the lobster depend for their sense of direction and position on certain small concretions located in their organ of hearing, which, upon movement, fall upon delicate filaments or cilia connected with the nervous apparatus. These concretions and cilia are very beautifully shown in dissections of the ear of the clam. And the lobster, upon shedding his shell, which he does periodically, shows these grains of sand, and if he is freed of them and placed in a tank of distilled water he has absolutely no sense of direction, and if turned upon his back he makes no effort to assume a normal position. The vestibular apparatus, including the semicircular canals, are the homologue in the human being of these simpler mechanisms in the clam and lobster.

The physiology of the cerebellum has received much attention by students of the nervous system from the time of Petit, about 1710, to the present time, but our knowledge is still very chaotic, especially pertaining to localization of cerebellar lesions. Many signs and symptoms have been advocated for this purpose by eminent men, while diametrically opposite results were arrived at by no less careful and authoritative observers. Before we can attempt to make any use of the Barany reaction in localization of lesions, it is first necessary to understand the relation of the cerebellum to the rest of the nervous system, which is accomplished by certain afferent and efferent paths that pass through the superior, middle, and inferior peduncles, respectively. The fibers of the superior peduncles arise for the most part in the

cells of the dentate nuclei, run forward to the mesencephalon, where most of them decussate beneath the corpora quadrigemina and terminate in the red nuclei. From the red nuclei fibers run to the optic thalami and are again relayed to the cortex. The superior peduncles also contain a few afferent fibers, according to Mingazzini, which probably arise in the thalami and pass through the red nuclei, decussating before reaching the superior cerebellar peduncles. The middle peduncles are mainly composed of afferent fibers to the cerebellum which arise in the cells of the pontine nuclei. They cross the median line of the pons and terminate in the cerebellar cortex of the opposite side. Since the cells of these crossed ponto-cerebellar fibers are in relation with the final ramifications of the fibers originating in the frontal and temporal cortices, it follows that each cerebral hemisphere is indirectly connected with the opposite half of the cerebellum by these fronto-temporo-pontine paths. According to Cajal, fibers from the Purkinje cells run through the middle peduncles, cross the pons, and then descend in the lateral column of the cord to terminate around the motor cells of the anterior horn. The inferior peduncles contain both afferent and efferent fibers, mainly afferent. Some fibers ascend from the cord and others from the medulla. They run in the lateral columns of the cord, forming the direct cerebellar tracts of Flechsig, which ascend through the restiform body to the vermis.

The technique of the Barany reaction or test is as follows: The turning test is performed by placing the patient in a smoothly revolving chair in which there is no vibration, and revolving it either to the right or left for, say, ten revolutions. In a normal individual with the head erect, this causes movement of the fluid in the horizontal canals, and if the head is inclined either forward or backward it produces a corresponding stimulation of the vertical canals. This stimulation of the semicircular canals produces through the nerve pathways to the eye a nystagmus of about 26 seconds' duration with the slow component to the side that is stimulated.

The caloric test is applied by douching the ear with water at 68° F. for a period of about four minutes. If the head is erect the vertical canals are stimulated, and if the head is inclined forward or backward the horizontal canals are then brought into the vertical plane and are stimulated. This stimulation depends upon movement in the fluid in the canals due to the cooler upper stratum falling, much after the fashion of the circulation in a radiator, and the nystagmus is produced by stimulation passing from the ear through the posterior longitudinal bundle to the nuclei of the sixth and that portion of the third nerve that enervates the internal rectus. This causes a conjugate deviation of the eyes, which is converted into a nystagmus by impulses from the cerebrum, which restore the eye to its normal position. In a person in deep narcosis stimulation of the semicircular canals does not produce nystagmus, but a conjugate deviation, because the cerebral mechanism is eliminated by the anesthetic. The vertigo is produced by the stimulus from the ear passing through the cerebellum to the cerebrum. This causes a confusion resulting from the coming into consciousness of afferent and efferent impulses which are ordinarily integrated but become dissociated. The ear is the most important peripheral organ which sends such impulses efferentward, and any slight disturbance of the labyrinth results in confusion of the patient's conception of his position to space. The normal individual is aware of his position in space and can, without difficulty with his eyes closed, locate an object previously touched, as the examiner's finger held in front of him. When his ears are douched, however, or if he be turned in a smoothly revolving chair, he past points in a definite way. If cold water (68° F.) is used for douching the right ear, for instance, or if the patient is revolved to the right, he will past point to the right, and if hot water (112° F.) is used, or if the

patient is rotated to the left, he will past point to the left. The patient's head should be held in a fixed position during these pointing tests. These same reactions are true of the wrist, elbow, foot, head, and trunk.

It seems that the pathways by which the stimuli are carried from the vestibular apparatus through the cerebellum to the cerebrum are by way of the inferior cerebellar peduncles for the horizontal canals and the middle cerebellar peduncles for the vertical canals, and, after passing through the cerebellum, they reach the cerebrum by way of the superior cerebellar peduncles. Nystagmus upward is caused by neuraxial lesion, which interferes with passage of impulses from the vertical canals, and these interruptions are usually produced by tumors of the cerebello-pontine angle, internal hydrocephalus causing pressure on the floor of the fourth ventricle, or tumors in the cerebellum causing pressure on the pons. According to Mills and his colleagues, the fibers from the horizontal canals have separate pathways from those of the vertical. Those from the horizontal are confined to the medulla and enter the cerebellum through the inferior peduncle, while the fibers of the vertical canals ascend into the pons and enter the cerebellum through the middle peduncle.

In any attempts to interpret the findings obtained from the Barany tests, we must first bear in mind that each reaction is dependent upon a definite arc, and that it is interruptions in the impulses passing through these arcs that cause variations from the normal, and upon our interpretation of these variations the value of the Barany reaction depends. While it is not so easy or simple to demonstrate the intactness of these arcs as it is the better known reflexes, such as the knee-jerk for instance, they are probably no less definite.

Although the author of these reactions was an otologist, and some of the most important work on them has been done by another otologist, namely, Jones, and the work has been clasped to the bosom of the otologists in general, I believe it to be more essentially the work of the neurologist than of the otologist and should be employed as part of our routine examination in all of our suspicious cases.

Since the above article was written my attention has been called by Dr. Emil Amberg to two articles of much historical value bearing on this subject, namely, "Labyrinth und Nystagmus," in *Archiv für Ohrenheilkunde*, by Dr. Martin Sugar, and "Otologischer Teil," in *Monatsschrift für Ohrenheilkunde und Laryngo-Rhinologie*, by Dr. Martin Sugar. These articles seem to prove that elaborate animal experiments were conducted by Dr. Andreas Högyes as far back as 1881, which established the true function of the labyrinth and semicircular canals in relation to equilibrium. This, however, does not detract from the practical value of Barany's work.

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ACUTE MERCURY POISONING.

In the *Journal of Medical Research* for March, 1917, Burmeister and McNally reach these conclusions from experiments on animals:

1. Mercury can be detected chemically, frequently quantitatively, in the blood of animals poisoned with mercuric chloride, within a very few minutes after it is administered.

2. Degenerative changes, leading to individual cell death, take place rapidly in the kidney and occur simultaneously with the presence of mercury in the circulating blood.

3. In massive intoxication immediate renal changes vary with the size of the dose. Hepatic changes vary as the duration of the intoxication. In smaller doses renal changes vary as the duration of the intoxication.

4. The degree of renal or hepatic degeneration does not necessarily vary directly as does the amount of mercury contained in the circulating blood.

EDITORIAL.

HYPODERMOCLYSIS IN THE DIARRHEA OF CHILDREN.

It is scarcely more than twenty years since hypodermoclysis became generally known to the profession, and we think it is a fair statement that it is not so frequently resorted to for the relief of any type of case to-day as it was ten years after its introduction. This is due, in part, to the fact that its novelty has worn off, to the fact that certain contraindications, like dropsy or pulmonary edema, forbid its use, to the discomfort which it causes many patients, and, last of all, to the introduction of the Murphy drip, which, however uncomfortable it may be, nevertheless usually causes less annoyance than the injection of a considerable quantity of salt solution under the skin.

In infancy both hypodermoclysis and the Murphy drip are difficult to employ because of the restlessness of the child, and the struggle with the carrying out of either of these methods by the physician and nurse naturally brings forward the question as to exactly how advantageous its employment is. Whatever clinical observation may have shown in the past, nevertheless careful, scientific investigation, concerning the rapidity of the absorption of liquid, the absorption of the salts employed and the speed of their elimination, was needed to reach definite conclusions.

These conclusions have now been, at least in part, obtained by an investigation carried out by Holt, Courtney, and Fales concerning the excretion of the sodium chloride and the water when injected subcutaneously, the investigation having been carried out in the laboratory of the Babies' Hospital, of New York, and the Rockefeller Institute. Studying cases of diarrhea in infancy, they showed that there was a great loss of salts, especially the more soluble ones, and, noting a very definite gain in weight after the employment of hypodermoclysis, the question which presented itself was as to whether this was solely due to the increased liquid provided, or to the retention of the salt. The method of injection was to use freshly distilled water, sterilized in the flask used for hypodermoclysis, this flask being fitted with a two-hole rubber stopper carrying short pieces of glass tubing, one of which was connected by a rubber tubing with an ordinary hypodermic needle. The flask was then heated to body temperature, hung at a suitable height above the patient, kept warm by being wrapped in a piece of cloth, and inverted so as to permit the flow. The needle was usually inserted in the back between the scapulæ, and held in place by strips of plaster. The salt solution used consisted at first of sodium chloride, 0.86; potassium chloride, 0.02; calcium chloride, 0.64 (including water of crystallization); and distilled water, 100 Cc. About 200 Cc. of the solution was generally employed, and one to three hours was required for its absorption, according to the degree to which the infant had been deprived of fluid by purgation. The rate of absorption varied greatly in different patients. In some it took place in four hours, in others not for twelve hours. Naturally the first injections were absorbed more promptly than the later ones. A slight reaction of one or two degrees of temperature often occurred.

After a certain amount of investigation the salt solution we have just named was given up and the ordinary salt solution, by which we presume is meant Ringer's solution as modified by Locke, was resorted to.

Holt and his colaborers found that protracted vomiting robbed the body of both fluid and salts, as did diarrhea, and that a considerable portion of the salt is usually retained for two or three days, sometimes for a longer period, the retention of the water following the retention of the salt. In normal children the greater portion of the water is apparently excreted in the course of the first twenty-four hours, and the salt often escapes in great part in the first six hours, which emphasizes the fact already known, namely, that the body

speedily eliminates salts for which it has no use, provided that the kidneys are not so impaired in function as to make this impossible, when many salts, notably potassium salts, otherwise innocuous, become hurtful.

ACETONURIA AND INANITION IN CHILDREN.

The readers of the GAZETTE will remember that from time to time we have considered rather fully the subject of acetonuria and acidosis, and that about a year ago we discussed the work of Howland and others in connection with the acidosis which develops in the summer diarrheas of infancy. It has become increasingly evident, and we think this has been made clear by previous summarizations of this subject, that there is a difference between acidosis, to use that term in a strictly accurate manner, and acetonuria, which represents a state in which there is an excessive formation of beta-hydroxybutyric acid, diacetic acid, and, finally, acetone itself. These bodies seem to be due to faulty metabolism of fats, whereas acidosis covers conditions arising from other causes possibly not so well understood and already discussed in these pages.

It has long been known that starvation induces acetonuria because the body begins to utilize its own tissues in order to obtain energy and heat after the deprivation of food, and a similar condition, of course, exists in the presence of the vomiting and purging of infantile diarrhea. For this reason it has been considered by Veeder and Johnston that it would be advantageous for us to gain some idea of the amount of the acetone bodies and acidosis in childhood resulting from an inanition not due to disease but to the deprivation of food. In five instances the period of starvation lasted twenty-four hours, in thirteen other cases it lasted forty-eight hours. A rapid increase in acetone elimination takes place in the second twenty-four hours, as might be expected. None of the children as a result of these brief periods of inanition showed any of the clinical evidences of so-called acetonuria. There was no nausea, vomiting, flushing of the face, temperature variation, or labored breathing. Veeder and Johnston think that the absence of these symptoms in these experimental children indicates the formation of the acetone bodies can hardly be the fundamental cause of the symptoms so often regarded as due to acidosis. This view is substantiated by the fact that clinical observers have long thought that the symptoms of the summer diarrhea of infancy were not due so much to the presence of ketone bodies, formed as a result of vomiting and purging, as they have been due to the absorption from the alimentary canal of certain toxic substances primarily contained in the food, or developing in the food while in the alimentary canal, either because of putrefactive change or because of perverted digestive function.

It would seem evident that some of the symptoms manifested by children suffering from summer complaint may be due not only to poisons which they make from their tissues, but that the problem is really more complex and that two or more sources of intoxication are active factors to be considered in each case.

For this reason the use of carbohydrates and alkalies is not all-sufficient in the treatment of these states. Every clinician knows that the fats and proteins must also be eliminated from the diet.

THE TOXIC EFFECT OF EMETINE HYDROCHLORIDE.

We have so often called attention in these pages to the fact that any drug which is powerful enough to do good will, if wrongly used, also be powerful enough to do harm, that we hesitate to reiterate this truism in therapeutics; nevertheless it is a fact which cannot be too carefully borne in mind, since it is intimately associated with the question of proper dosage, and this, in turn, is essential if excellent results from medication are to be obtained.

Emetine hydrochloride is so commonly employed in medicine to-day that many of

us are prone to forget that ten years ago it was regarded rather as a pharmaceutical or chemical curiosity, and no one thought of employing it as a curative agent, much less one that possessed definite physiological and parasiticidal power. With the discovery that it was a specific agent for the treatment of entamebic dysentery its popularity became wide-spread, and undoubtedly many cases of dysentery that were not amebic have been treated by it without good results, for the very obvious reason that it is ineffective in the dysentery which is due to the bacillus of Shiga and other microörganisms than the entameba.

It is natural, under these circumstances, that a number of papers should have appeared in Europe and in this country emphasizing these facts and also the fact that it is toxic. One of these papers, by Johnson and Murphy, of the U. S. Army, is published in the *Military Surgeon* for January, 1917, in which they report the death of two men, under treatment for entamebic dysentery, who died from peculiar and unusual conditions in no way associated with the disease from which they suffered, and also five cases which showed physical signs and symptoms which led them to believe that emetine was responsible therefor. They also quote a considerable amount of literature, American and English, in regard to the toxic effect of this substance. In one of the fatal cases one-third of a grain of emetine was administered three times a day from August 21 to August 24. It was repeated from September 5 to September 15; and, again, from September 27 to October 3 in one-half-grain dose once a day. The patient after this was found to have a rapid pulse, motor weakness, and great nervousness, with a very low blood-pressure, the pulse later becoming irregular, the rate rising as high as 162 and the respiration 42. The lungs showed evidences of congestion, and there was cough with some expectoration. On October 5 there was a foul diphtheritic odor to the breath and the throat showed a pustular exudate on the posterior wall. The tongue was red, beefy, dry, and fissured. The temperature was 101.6°. Death took place on that date. In still another instance symptoms of a somewhat similar nature developed, except that motor weakness and difficulty in swallowing and in retaining food seemed to be more marked symptoms. In this instance one-half-grain doses were given twice daily for twelve and a half days, in the first course of treatment; one-half grain daily for fourteen days in the second course; and one-half-grain dose daily in the third course. In this instance, too, the drug was stopped on account of excessive nervousness. The patient was stimulated, but his weakness increased, and he died apparently of acute dilatation of the heart.

It would seem probable from this and other papers, therefore, that emetine has to be used with some care, particularly if the patients are already weakened by disease. The method which these surgeons advise is the use of one-third grain once a day, increasing by one-third each day until one grain is given per diem, and this is continued until a total of eight grains has been administered altogether. This treatment is accompanied by large doses of bismuth subnitrate, and during the next ten days colonic irrigations of 1:1000 quinine solution once or twice a day. If the stool still shows ameba one grain of emetine is given hypodermically for three days. This method has been found efficacious in making the stools sterile and free not only from entameba but also from cysts. Sometimes the patient requires a third course.

THE TREATMENT OF SYPHILIS.

The introduction of salvarsan into medicine was an epoch-making advance in therapeutics. It was the most scientifically constructed medicament known to man, and the manner of its development established the basis for the new science of chemotherapy. Its superior value in syphilis and in certain other diseases, such as yaws, relapsing fever, tertian malaria, etc., are all well attested. The elaboration of salvarsan (this trade name is meant to refer to dioxydiaminoarsenobenzol, no matter by whom

prepared) is most complicated and difficult: it must pass through many intermediate stages. The purity of these intermediate products will of necessity influence the purity of the final compound. Salvarsan cannot be purified by repeated crystallization. It is quite possible, therefore, that traces of various impurities may be present in the final product: as a matter of fact we know, from ultimate analysis, that such is the case, and furthermore, that in the present state of our knowledge this cannot be entirely avoided. Inasmuch as absolute chemical purity is not obtained we cannot expect absolute constancy in biological effects. Depending upon the character and quantity of impurities, there will be variations in toxicity, and to a lesser degree in therapeutic effect.

It is important to recognize that the toxicity of salvarsan varies, for such knowledge is essential to safe clinical guidance. In the light of this knowledge it is not justifiable to give large daily administrations of salvarsan or neosalvarsan for a number of days, as a few experienced clinicians have advocated. With products of low toxicity this might be done without danger, but without possession of the laboratory records of the product employed, a distinct hazard is encountered by such heroic methods of treatment.

No one is in a position at the present day to set down a prescribed formula as to the most approved and perfect method of treating syphilis. Some years ago, before the advent of the Wassermann test, we laid down, in the plentitude of our ignorance, a routine treatment of syphilis. So much depends, nowadays, upon the stage in which the patient presents himself for treatment.

In the primary stage, abortive cures can often be achieved. The later the patient comes under vigorous treatment the greater is the opportunity for wide-spread diffusion of the spirochætæ. These may find their way into the tissues and may then become relatively inaccessible to therapeutic agents. No two cases of syphilis are identical, by reason of the fact that the quantitative infection, the defensive power of the body cells and fluids, and the topographic distribution of the parasites will vary. In one patient the disease may induce severe and fatal symptoms, while in another the parasites may after a time take on almost a saprophytic existence, and the patient may live to old age in average health. Syphilis is veritably a disease of paradoxes.

There are many cases in which it is impossible to secure a negative Wassermann by the most vigorous therapeutic measures. This may be due to the anatomical inaccessibility of the spirochætæ or perhaps to the fact that they have gone into a resistant resting stage. I believe that where cures cannot be achieved the disease, if not advanced, may be arrested and robbed of its terrors by adequate treatment. The question may pertinently be asked, What constitutes adequate treatment?

In an early case the ideal treatment would be weekly intravenous injections of salvarsan for ten or twelve weeks. If the injections are borne well and there is no reaction, the early treatments might be given at intervals of five days. If the patient loses vigor or develops headaches or digestive disturbances, the injections should be interrupted, and after a brief rest mercury should be used.

The insoluble mercurial compounds are efficient, but the dose must be guarded and the kidneys watched, as all insoluble mercurial injections cause an accumulation of the drug in the muscles. The safest method of using large doses of mercury is by inunction. It is rather remarkable that the medical profession has been using inunctions for almost 400 years and has repeatedly attested the merits of this method, but has slighted it because the method was dirty. Such is the force of medical tradition that we have adhered to a dirty mercurial instead of seeking a clean one. Calomel rubs into the skin more easily than mercurial ointment and is absolutely cleanly. We have demonstrated its absorption by laboratory studies. Thirty or forty grains in 10 grains of lanolin and thirty grains of lard should be rubbed in daily.

In conclusion we emphasize the statement

that the patient must be treated as well as the disease. The Wassermann reaction will sometimes improve under freedom from specific treatment and resort to general invigorating measures.

THE EVALUATION OF TRAUMA.

In these days of workmen's compensation and the claims resulting therefrom, it is natural that the man whose whole capital is his bodily strength may often quite honestly attribute any of the ills from which he suffers to trauma, for which he can always recover damages. This is particularly so regarding hernia, because through generations it has been regarded as an affliction always caused by strain. The philosophic discussion of the question by Fay (*Surgery, Gynecology and Obstetrics*, February, 1917) is therefore of considerable value. Though the term traumatic hernia is well recognized by the profession as designating a rupture directly or indirectly due to local injury, this term has often been applied to any hernia developing while its bearer is at work, even when relaxed fascia and enlarged rings could readily be demonstrated. The true traumatic hernia is usually recognized as such, nor is there any question concerning it. What Fay calls the industrial hernia is that about which there are so many contests. In these hernias there is no external sign of violence, but the bearer insists, and usually believes, that the lesion was due to a blow, fall, twist, heavy lifting, overstraining, or indirect violence. Brandenburg reports on the examination of nearly 4000 workmen, employed in digging the St. Gothard tunnel, and says that over 80 per cent exhibited a predisposition to hernia—*i.e.*, the external ring admitted the tip of the index-finger; whilst Schwiening as the result of an examination of about one million healthy young men examined for military service in Germany observed that 16 per cent had hernias. Zollinger reported on nearly 5000 examinations, over 40 per cent showing a slight tendency to hernia. Autopsies on 200 men, who during life had shown no signs of hernia, proved to Murray that 34 per cent had a so-well-defined peritoneal bulge as to justify the term "sacculated hernia."

Berger notes that of 117 who attributed their hernia to trauma, 86 had other hernias of whose existence they were ignorant. Of the cases of supposed traumatic hernia referred to the chief insurance referee from the lower insurance tribunals of Germany in 1905, only 2 per cent were declared to be in reality traumatic; although in recent years a more liberal tendency has been observed, the percentage having risen to 5, 6, and even 7 per cent.

Akerman, an authority on compensation in Sweden, says that in eight years he has had only 170 cases of traumatic hernia, and that after operation 40 of these were rejected. There are 4000 operations annually for hernia in Sweden. In France in order that a hernia be adjudged traumatic, the national insurance bureau demands that there shall have been a direct contusion of the inguinal region, or that the work being done shall have required more than usual exertion. The injured man must have been forced to stop work immediately following the accident. He must have been forced to seek medical attention at once, or at most by the evening of the following day.

Brouardel says that the following points must be given consideration:

When a traumatic hernia first appears it is always of small volume. If the volume of a hernia exceeds that of an egg, one may be sure that the hernia antedated the accident. In the majority of cases a traumatic hernia is unilateral; bilateral hernias, or a unilateral hernia with a markedly enlarged ring on the other side, are strongly suggestive of hernia disease. If the inguinal canal is little more than an orifice, and the finger, introduced into it, enters the abdomen, the inner wall of the canal is weak, and the idea of a traumatic origin may be rejected. In traumatic hernia the inguinal ring is small, hardly admitting the tip of the index-finger; the introduction of the finger causes pain. The presence of an ectopic testicle speaks strongly against the traumatic origin of a

hernia; an ecchymosis is suggestive of such an origin. Marked obesity and emaciation alike weaken the abdominal walls, and are to be considered as predisposing to hernia. Moreover, when an inguinal canal is short and broad, its course only slightly diagonal, the hernia is probably an old one.

It is held by the law that a workman is entitled to compensation if an accident is shown to have been the immediate cause of hernia, since if it had not been for this accident, even though there were predisposing conditions, the hernia would not have developed. For practical compensation purposes then any hernia is considered traumatic when it is proved that the injury was the immediate, though not the sole, cause of the hernia. It must be admitted that the absence of pain and the ability to continue work are hardly compatible with the idea of traumatic hernia. It must be borne in mind, however, that there are wide variations in the individual susceptibility to pain, and that a workman with steady nerves and a strong will might continue to work under conditions which would completely overcome a fellow workman, or might postpone a visit to his physician for some days unless the hernia should become strangulated.

An industrial hernia is undoubtedly always small when it first appears, and hence there is no injustice in estimating its maximum early size as that of an egg. Fay holds, however, that it is not safe to say that in traumatic hernia the hernial ring is always small, barely admitting the tip of the index-finger; any condition present in four-fifths of the men examined cannot be considered abnormal, nor can there be any hard and fast rule concerning the size of an inguinal ring. It is said that the majority of cases adjudged traumatic and granted compensation in Germany are those in which the hernia was strangulated when it first appeared. Cases in which strangulation does not occur but are difficult of reduction, when once reduced do not come down again.

The indications for operation in industrial hernia are in general far broader than in private practice. Practically all of these hernias occur in men who are performing hard manual labor, and the inconvenience and the danger of strangulation are accordingly increased. Every probable industrial hernia should be entitled to operation and a reasonable time allowance given for recuperation. In the majority of cases this should be the only compensation allowed. In recent traumatic hernia the hernial sac is smooth and thin, and is not adherent to cord or ring An adherent sac, a large inguinal ring with broad margins, a short, broad inguinal canal, a patent tunica vaginalis, a thickened sac, a large hernia or one that comes down and returns with a simple change of position—all these characterize the old hernia.

This analysis of the medicolegal aspect of hernia seems entirely rational; still more so if such hernias develop in the course of work, and if the employee on entrance into service has submitted to a thoroughly competent careful examination. To those who see many of these cases it is well known that the hernia may develop somewhat insidiously with pain not sufficiently severe to particularly attract the patient's attention; indeed, a discovery of a lump by sight or touch may be the first sign, and this may occur in those who exhibit no anatomical conformation which would suggest the probability of such an occurrence. It is also true that when there is a hernia, and one of comparatively large size, it may be caused by a single turn, twist, wrench, or heavy lift. Under such circumstances there is always a predisposing condition—*i.e.*, a patulous tunica vaginalis—and it is these hernias which are particularly liable to strangulation.

The enormous recent-day increase in the number of hernia operations is due to the fact that all large industrial establishments refuse to accept a man who exhibits either a rupture or a condition strongly predisposing to its formation. Hence the majority of workers come not for the relief of their present symptoms, but for the removal of an obstacle to obtaining employment. The high percentage of radical cures is shown by the few operations for recurrence.

BLOOD TRANSFUSION.

Blood transfusion, of perennial interest, supposed to have been discussed and put to practical use among the ancient Egyptians, and, according to Eisenbrey (*Cleveland Medical Journal,* March, 1917), sufficiently well studied in 1492 to have suggested its application for the cure of the then Pope, could necessarily have been applied widely only in recent times, since for success surgical cleanliness is needful, provision must be made against coagulation of blood, and the blood of the donor must not be hemolytic to that of the receiver.

Concerning these points and methods Eisenbrey points out that the use of syringe and cannula is old, and that even in the early part of the eighteenth century the use of dissimilar bloods, *i.e.,* animal's to man's, was recognized as unsatisfactory.

Following a period when vessel-to-vessel suture was employed, open to obvious objections, not the least of which was the uncertainty of dosage, there came an era when the indirect methods were universally applied, the blood being administered by syringe; from paraffin receptacle; or mixed with an anticoagulant. Lindeman used large glass and metal syringes, with which he withdrew blood from the donor and injected it into the patient through cannulæ inserted into the veins of each, the syringes being thoroughly cleansed between each filling and emptying. Unger simplified this technique by interposing a two-way stopcock between the cannulæ in patient and donor in such a way that with one syringe it is possible to withdraw and inject the blood without having to detach the syringe or apparatus, clotting being prevented by keeping an ether spray playing on the syringe. It has been found that a .2-percent mixture of sodium citrate and blood prevents clotting and is non-toxic, as much as 5 grammes of a sodium citrate being tolerated. This is more than twice the quantity required to prevent clotting in a liter of blood.

Eisenbrey holds that the points to be considered in choosing a method for personal use are simplicity, ease, and certainty of application, control of amount and rate of introduction, freedom from the danger of sepsis, clotting, or the introduction of air or other emboli, and the least amount of operative disturbance in both patient and donor. He prefers, as the most sure and safe way, the syringe method with the two-way stopcock.

As to the agglutinative and hemolytic reactions which account for the fatal accidents when transfusions are performed without having first tested out the blood of donor and patient, while it is true that incompatibilities are found in a very small percentage of cases, they furnish the chief cause of death in transfusion. Such accidents are entirely preventable. It exceptionally occurs that in case of acute hemorrhage in a healthy individual transfusion becomes an emergency measure and allows of no time for blood testing. Under such circumstances the use of the blood of a relative adds a factor of safety to the procedure. As to the test of incompatibility, Eisenbrey believes the actual standard cross tests between washed cells of patient and serum of donor, and the reverse of this, constitute the most reliable safeguard against accident. These tests may be completed and interpreted in three hours. When subsequent transfusions are done it is doubly essential to have the tests made whether there was or was not any suggestive incompatibility in any of the donors tried before the first transfusion. If the second transfusion be made from the same donor used in the first the necessity for preliminary tests is all the greater. Eisenbrey states that he has had 48 donors tried out for a single patient before a satisfactory one was obtained; nor is blood relationship a guarantee of compatibility.

Transfusion is a specific for rapid, copious hemorrhage; nor must the amount injected equal that lost. The whole blood very promptly brings the volume of the circulating blood to an efficient degree even though the amount introduced is comparatively small. In hemorrhage of long duration and small amounts the immediate

effects are not so pronounced. The transfusion may accomplish in a few days what other measures have failed in after weeks of use. Transfused blood is not only mechanically helpful, but has a nutritive value and increases red cells, is hemostatic, hemopoietic, antitoxic, and antibactericidal. Simple anemias both of acute and chronic type benefit by transfusion. In the toxic or septic types the help is but transitory. In the purpuras transfusion varies in helpfulness. The severe hemorrhage of hemophilia is almost at once checked, though recurrence is not prevented. In melena neonatorum transfusion is a specific. It is apparently more effective than subcutaneous injection of human serum or whole blood.

The site indicated in infants is the longitudinal sinus; a small cannula being introduced into the sinus through the anterior fontanel. The external jugular vein is also practicable. In infants transfusion has a very limited usefulness as a curative agent, though it produces always a temporary increment of vitality. In various asthenic conditions it is helpful, particularly in delicate babies.

The average transfusion is from 500 to 700 Cc. Damage can be done by overloading weakened circulatory apparatus. At times repeated small transfusions are better than one large one. A watch must be kept on the patient during transfusion for respiratory, vascular, and cardiac signs of embarrassed circulation. When less than 800 Cc. is used there is no temperature or untoward reaction. There is usually no difficulty in obtaining healthy donors, nor do these people object at all if the syringe-cannula method is employed.

This somewhat enthusiastic laudation of transfusion has its merits as bringing again before the profession a method of treatment of assured value in hemorrhage and illuminating-gas poisoning; of possible value in shock and of probable value in many chronic conditions attended by anemia. The needling and syringe method offers a procedure so simple that its frequent repetition is open to no objection on the part of the patient. The immediate effect of such transfusion, even when comparatively small quantities of blood are used, is surprisingly good. When one realizes the possibility of incompatibility between blood of donor and recipient the number of accidents occurring in cases in which no preliminary blood studies have been made is astonishingly few.

REPORTS ON THERAPEUTIC PROGRESS.

COMMUNICABILITY OF POLIOMYELITIS.

Writing on this subject in the *Archives of Pediatrics* for January, 1917, KERLEY reports some cases and states that every man may draw his own conclusions from his results. The following seem reasonable:

1. That poliomyelitis may be communicated through personal contact.

2. That there are innocent carriers who spread poliomyelitis.

3. That but a small percentage of children are susceptible to poliomyelitis. Schick has shown, in the use of the test bearing his name, that among 747 children under fifteen years of age but 34.9 per cent were susceptible to diphtheria. The susceptibility of children to poliomyelitis is much less than the susceptibility to diphtheria. Probably from 90 to 95 per cent possess an immunity.

THE TREATMENT OF BURNS BY PARAFFIN.

In the *British Medical Journal* of January 13, 1917, HULL reminds us that Barthe de Sandfort introduced a treatment for burns by means of a preparation of paraffin which he called ambrine. The treatment consisted in washing the burns with sterile water, drying, and painting or spraying a layer of ambrine over the surface. The surface was then covered with a thin layer of wool, and a second coat of paraffin ap-

plied. The paraffin solidifies almost instantaneously, and a thick layer of wool and a bandage are then applied. The paraffin preparation, ambrine, is a secret one, and the property of the Ambrine Company, Paris.

Observations of de Sandfort's treatment, and experiments with ambrine, carried out in a military hospital, gave one the impression that the treatment was valuable. Burns healed with rapidity; constitutional symptoms rapidly abated; pain was reduced to a minimum; scarring appeared to be obviated, or at any rate was not apparent. The need for grafting large burns appeared to be avoided. The burns healed so rapidly with healthy granulations that there appeared to be nothing gained by grafting. The patients were singularly free from sepsis. The conclusion arrived at from experimenting with the ambrine treatment was that mild burns healed with singular rapidity, and severe cases recovered which would have been unlikely to recover by the ordinary methods of treatment. Observers who had had large experience of burns treated by picric acid, ointments, and other methods in ordinary use, were unanimously of opinion that the paraffin method was superior to the older methods. The experience of those who had witnessed the results of burns after liquid-fire attacks was that the ambrine treatment would save many lives, and accelerate the recovery of all burns.

A preparation resembling ambrine may be produced by impregnating hard paraffin with a small quantity of tar. The substance is not in very good solution, and falls to the bottom of the paraffin when the wax is heated. The excellent results obtained would therefore appear to be due to mechanical causes. The protection of the burn from the air, the protection of the newly-formed granulations from damage, and the splint-like effect of the wax in holding the damaged tissue immobile and at rest, appear to be the attributes which produce the effect. The heat of the applications and the conservations of heat to the surface may encourage the lymph flow, determine the supply of blood to the new capillaries, and favorably affect healing. The relief from pain and the rapidity of healing is due to the fact that the burn is held at rest in a plaster-like cast of paraffin, and a suitable nidus in which the epithelium will proliferate is provided.

The absence of scarring depends upon the fact that skin can be reproduced in two ways. First, by direct proliferation of the epithelium in the depth of the wound. This method of healing is only possible in wounds of the first and second degrees, which form the vast majority of all cases of burns coming under treatment. Secondly, by the extension of the epithelium from the edge of the wound in cases of burns of the third and deeper degree. These burns are comparatively rare, and are the only cases suitable for grafting. The effect of the paraffin in the first class is to protect and stimulate the growth of epithelium, islets of which can be seen growing over the base of the burn. In the second class the epithelium spreading from the edge is protected and stimulated.

The first point to be determined was whether equally good results could be obtained with commercial paraffin, section wax, or similar pure hard paraffin. The ambrine preparation has peculiar and valuable mechanical properties. It has a lower melting point than ordinary section wax, is much more plastic when cooling, and has not the tendency to crack which ordinary hard paraffin has. It also adheres well to the skin and is not liable to slip after a dressing is applied.

Hard paraffin is not a suitable application in its raw state; it lacks the mechanical properties of ambrine; there is an absence of the flexibility and adhesiveness which ambrine possesses. Hull has found that if hard paraffin of suitable melting point be subjected to a temperature of 130° C. by means of superheated steam, the melting point was reduced about 2° C., and the hard paraffin now possessed the mechanical properties of ambrine. The therapeutic value of ambrine appears to be entirely mechanical, and Hull suggests that the processes of impregnation with tar or other

substances are associated with the application of superheated steam, and that it is this superheated steam that is the essential process in its manufacture. The clinical results of the application of hard paraffin—treated with superheated steam—to burns appear to him to be indistinguishable from those of ambrine.

Better results are obtained by the addition of certain antiseptic and stimulating substances. The wounds become clean more rapidly, pain is decreased, and the offensive smell associated with ambrine dressings is avoided, and the burns heal more quickly. It was found necessary to change the treatment of sluggishly-healing burns by ambrine to a paraffin containing an antiseptic. The change was always beneficial. The argument that an antiseptic will destroy the saprophytic action of the bacteria and will retard the treatment has not been borne out by clinical experience.

It is unnecessary to describe in detail the various experimental preparations. Laboratory experiments were made with a view to impregnating paraffin with various antiseptic substances—resin, essential oils, and tars. Experiments were made in order to produce a paraffin possessing the requisite melting point, plasticity, and adhesiveness. Cases were treated in the burn wards with various experimental preparations. Tar preparations were at first used; paraffin impregnated with oil of eucalyptus proved more efficacious. In order to obtain a painless treatment experiments were made with paraffin preparations containing analgesic substances. Potassium sulphate was used in one successful preparation (No. 4 paraffin), but was discarded as unnecessary in later preparations. After progressively improved results, a paraffin was finally arrived at having the mechanical properties of ambrine and containing a small amount of antiseptic. This is now in routine use known as No. 7 paraffin.

The results obtained by the use of No. 7 paraffin have surpassed the results obtained by ambrine or any other tried preparation. Severe burns of the third degree, accompanied by sloughing, and in a very septic condition, have cleaned and taken on healthy repair under this treatment, after a trial of the ambrine treatment. Severe burns of both palmar and dorsal surfaces of the hands, extending to the tendon sheaths, have healed in three weeks without contracting cicatrices. Extensive burns of the flexor surfaces of the limbs, the regions most likely to be altered by contracting cicatrices, have healed without apparent scarring. Burns of the face heal with a new healthy skin without scarring.

Severe burns due to cordite, petrol, and liquid fire have been healed with this preparation; there have been no untoward results.

Patients who have been admitted with septic burns of extensive areas have rapidly recovered from constitutional symptoms, the temperature usually becoming normal in a few days.

The treatment is practically painless, and patients rarely complain of pain after the first application. It has never been found in the least necessary to give an anesthetic for the first or subsequent dressings. The rapidity of healing, the absence of sepsis or pain, the healthy new skin resulting, without contractile cicatrices or deformity, have been really remarkable. Burns become clean more rapidly than under ambrine treatment. Sloughs of deep tissues, in some cases down to bone, readily separate, and the burns become clean.

The paraffin treatment is begun at the first dressing; very exceptionally, in very septic burns, the paraffin is replaced by hot boric fomentations for two days after two days of paraffin treatment.

The burn is washed with sterile water and dried. The drying is accomplished by placing a dry piece of gauze over the burn. An electric drying apparatus, such as is used by a hairdresser for drying hair, if available, is a convenient method of drying the burn.

The burn is next covered with a layer of paraffin at a temperature of 50° C. The No. 7 paraffin has a melting point of 48° C. The temperature may be estimated by waiting until the wax shows a solidifying film

upon the surface. A broad camel's-hair brush, sterilized in wax, has been found to be a rapid and painless method of applying the paraffin. A spray may be used, but sprays readily get out of order, are troublesome to use, and the dressing takes longer. In theory a spray should be used in order to prevent any damage to the epithelium. In practice we have found a brush, skilfully used, sufficiently satisfactory. Sprays are indicated in very painful cases. A metal spray of rather large bore should be employed. The spray must be immersed in hot water during use.

A thin layer of cotton-wool, cut the same size as the area of the burn, is placed over the wound after the first layer of paraffin has been applied. This layer of wool is covered with a second layer of paraffin. The wool is cut in thin sheets and pressed between layers of paper in order to obtain thin layers of wool. The dressing is completed by applying wool and bandage. The burns are usually dressed later. In the later stages, when the burn is clean and only a small amount of pus is formed, the dressing is changed every forty-eight hours.

Blisters are not interfered with in any way at the first dressing; the paraffin is applied after washing the burn. At the second dressing the dead layers of skin are cut away. Sloughs usually separate after a few dressings. The separation of sloughs is accelerated by applying a layer of jaconet over the wool and paraffin beneath the wool and bandage dressing.

Formula for No. 7 Paraffin.

Resorcin	1 per cent.
Eucalyptus oil	2 per cent.
Olive oil	5 per cent.
Paraffin molle	25 per cent.
Paraffin durum	67 per cent.

Melt the paraffin durum, and add paraffin molle and olive oil. Dissolve the resorcin in absolute alcohol (soluble 2 in 1), add the alcoholic resorcin, and lastly add the eucalyptus oil when the wax has cooled to about 55° C.

A smaller amount of resorcin may be used. The whole of the resorcin does not remain in suspension, and we have used a paraffin containing 0.25-per-cent resorcin with good results.

Difficulty having been experienced in obtaining resorcin in large quantity, beta-naphthol, which has the additional advantage of being a cheaper antiseptic, has been substituted for resorcin in more recent preparations, as follows:

Beta-naphthol	0.25 per cent.
Eucalyptus	2.0 per cent.
Olive oil	5.0 per cent.
Paraffin molle	25.0 per cent.
Paraffin durum	67.75 per cent.

Hull has employed No. 7 paraffin in certain stages of the treatment of trench feet. The mode of application of paraffin to the ulceration following frost-bite is in every respect similar to the application of paraffin in the treatment of burns, and the results have been equally satisfactory.

DISAPPEARANCE OF MALIGNANT TERTIAN CRESCENTS FROM THE BLOOD FOLLOWING THE INTRAVENOUS INJECTION OF TARTAR EMETIC.

In the *British Medical Journal* of January 6, 1917, ROGERS points out that although the discovery of the value of cinchona and quinine in malaria has been of incalculable value, nevertheless even quinine is not an ideal drug for the disease, because although it rapidly kills the intracorpuscular stage of the parasite and brings about the cessation of the febrile paroxysms, yet it completely fails to destroy the extracorpuscular cycle, which is responsible both for the frequent relapses of the ague, and, still more important, for the infection of mosquitoes, and through them of other persons. The difficulty in completely eradicating a malarial infection is well known. Thus Norman Chevers relates that he suffered from attacks for eighteen years in India after contracting the disease in Chittagong, and for six years more after he returned to England, and that his friend, Sir Ranald Martin, had frequent attacks of ague throughout his long Indian service, and for no less than thirty years more in England, although both of them took quinine freely for the attacks. Prolonged daily doses of quinine for months at a time will often prevent relapses, but even this measure may

fail. A drug which will really cure malaria and destroy the infective extracorpuscular stage of the parasite is, therefore, still much to be desired.

The uniform success which Rogers has already reported in the cure of kala-azar by tartar emetic intravenously, now amounting to over twenty consecutive cases in Europeans, led him to hope that the drug, once it is able to kill the Leishman-Donovan parasites, which are so highly resistant to quinine, might possibly also be inimical to the quinine-resisting stages of the malarial parasites, of which the malignant tertian crescents are the most characteristic. It is well known that once they appear in the blood they remain present for months on end quite uninfluenced by quinine. He has recently had an opportunity of testing the effect of the drug in two cases showing numerous crescents in the blood. Unfortunately it was not possible to follow up one patient, as he has left Calcutta in his ship. The rapid disappearance of the crescents from his peripheral blood was most encouraging, but Rogers realized that it would not be safe to draw far-reaching conclusions from a single case. Fortunately a second one soon presented itself.

A European male, aged forty-five, admitted for fever of ten days' duration accompanied by rigors. Very numerous ring malignant tertian parasites were found, several in every field of the microscope.

The rise of temperature to 104.8° on the evening after the injection of 8 cg. tartar emetic, followed by a very great reduction in the crescents in the peripheral blood, is very significant, in view of the fact that similar rises occur in kala-azar after the injections only as long as parasites are present, for such reactions are best explained as due to the liberation of toxins from the parasites destroyed by the drug. This view is supported by the fact that no ring intracorpuscular forms of the malignant tertian parasites were found during the time the crescents were present which could account for the febrile reaction.

Here we have a second case in which recently developed crescents rapidly disappeared from the peripheral blood following the intravenous injection of a single 8 cg. dose of tartar emetic. Two such consecutive cases are very unlikely to be an accidental phenomenon. The dose used in the last case is less than half what has been safely given repeatedly in kala-azar cases.

The following experiences of the use of tartar emetic in benign tertian malaria are also of interest. Early in September last an Indian boy was admitted to Rogers' kala-azar ward. He found very numerous benign tertian malarial parasites in his blood. Although Rogers recognized the presence of a rather serious infection he decided to try tartar emetic, and gave 4 cg. intravenously in a 2-per-cent solution, the strength used in all the cases mentioned in this paper. His temperature had varied during the previous three days from 98° in the morning to from 101° to 102° F. in the evening, but on the evening of the day on which the tartar emetic was given it rose to 104°, showing a strong reaction. On the following day very few benign tertian parasites could be found. Two days after the first injection the same dose was repeated. On that morning only one parasite was found, and none on the next day or on several other occasions during the next few weeks. As low fever persisted when Rogers saw the patient again, after an interval of three weeks, he did a spleen puncture and found Leishman-Donovan bodies, showing the case to be a mixed infection—a rare condition in Calcutta. As the boy objected to further injections he was given antimony ointment inunctions. He gained weight steadily, and has had no rise of temperature to above 100° F. during the last month. However, on making a recent examination of his blood Rogers found one ring and one extracorpuscular benign tertian parasite, thus showing that the two comparatively small doses of tartar emetic had failed to eradicate his malaria completely, and suggesting caution in expecting too much from such a short course of treatment. A 4-cg. dose was now given, and the parasite had disappeared again by the next day. He has had no quinine dur-

ing the two months he has been in the hospital.

Captain Hume has tried tartar emetic injections in two other cases of benign tertian malaria. In one man it required three doses of 4, 8, and 10 cg. to stop the paroxysms of fever and to cause the malarial parasites to disappear from the peripheral blood, so that in this case the drug appeared to be less efficient than quinine against the intracorpuscular stage of the benign tertian parasite. In the other case one 4-cg. dose was followed by the cessation of one paroxysm, converting the infection from a double to a single one. Quinine was then given and the fever ceased.

In the first of the above cases the effect of the tartar emetic on the malarial parasites was very striking, but in the second and third it appeared to be less efficient than quinine against the intracorpuscular stages of the parasite, while it is certainly far less convenient, owing to the administration of quinine by the mouth being much simpler than giving an intravenous injection.

Much further experience will be required to settle these points, but the indications to be derived from these few cases appear to be that quinine should be used to check the malarial paroxysms, while tartar emetic should subsequently be given intravenously, in the hope that it may prove of value in destroying he extracorpuscular stages of the malarial parasites, and so prevent relapses, and greatly lessen the infectiveness of the patient to malarial-bearing mosquitoes, by killing the crescents of the malignant tertian variety and the corresponding resisting forms of the other types of malaria.

In view, however, of the many disappointments which have been met with in attempts completely to eradicate the protozoal parasites of malaria, sleeping sickness, and amebic dysentery, it is well not to be too sanguine regarding the success, possibly only temporary, of tartar emetic given intravenously in causing the malignant tertian crescents to disappear from the peripheral blood in the two cases of Rogers. The observations are, however, of sufficient interest and importance to make it advisable to place them on record without delay, in order to allow others to investigate the subject, as many prolonged observations will be necessary before any reliable conclusions can be arrived at. If this drug should prove successful in really curing malaria, or in removing the infectiveness of the patients treated with it, a new and most important addition to our armamentarium in the battle against the most wide-spread scourge of tropical and subtropical countries will have been made, the value of which it would be difficult to overestimate.

MODERN DIAGNOSIS AND RESULTS, CLINICALLY, SEROLOGICALLY, AND SOCIOLOGICALLY, OF SYPHILIS.

B. A. Thomas in the *Pennsylvania Medical Journal* for January, 1917, reaches these conclusions:

1. The treatment of syphilis, notwithstanding the promise of salvarsan and its substitutes, judged from the excellent serological results extending in many instances over several years, remains empirical.

2. The ultimate proof of cure does not rest necessarily upon continuously negative Wassermann reactions for one, two, three, five, ten, twenty, or even forty years, but rather upon complete freedom of symptoms for a generation or more.

3. The Wassermann reaction furnishes the best control of treatment and is the most reliable index of cure subsequent to proper treatment.

4. The sheet-anchor in the treatment of syphilis is no longer mercury, but salvarsan, neosalvarsan, or one of their substitutes. It is of paramount importance, however, that the injections of arsenobenzol in the beginning be administered as early as possible and intensively in full doses commensurate with the physiological tolerance of the patient, not scattered indefinitely over months, interspersed here and there with a Wasser-

mann test. In view of the possibility of immediate cure by this drug, properly administered in the primary if not in the secondary latent stages of the disease, the treatment of syphilis, particularly in the chancre period, prior to the advent of a positive Wassermann, becomes an emergency operation, in many instances, no less imperative than appendectomy. Our experience dictates, as a reliable routine, two injections of salvarsan in the early chancre stage; at least three injections in the late primary and throughout the secondary or latent stage of the disease; and during the tertiary and hereditary forms of syphilis not fewer than four to six injections, supplemented by mercury and the iodides. If, after such treatment, the Wassermann reaction still appears positive, a second series of injections should be administered.

5. Serologically judged on a three months' to a five years' duration, syphilis, in the chancre stage, if diagnosed early, either clinically or if necessary by either the dark-field microscope or the Wassermann reaction, may be cured by two injections of salvarsan or neosalvarsan; indeed, if the diagnosis be made, particularly before the advent of a positive Wassermann, one dose of either of these drugs may be sufficient.

6. Secondary syphilis seems to do just as well without mercury, provided enough salvarsan or neosalvarsan be given to produce a negative Wassermann.

7. The serological results in tertiary syphilis treated intensively with salvarsan and its substitutes are not so brilliant as those of the secondary period.

8. The best substitute for salvarsan and neosalvarsan is the Polyclinic preparation of arsenobenzol, which although apparently not so effective in eradicating the Wassermann, is essentially devoid of any toxicity, even less so than neosalvarsan. [This is not on sale.—ED.]

9. The French preparation of arsenobenzol (Billon) and the Canadian diarsenol (Synthetic Drug Company) are beautiful products and may be just as efficient as salvarsan and neosalvarsan, but on account of their greater tendency to toxic phenomena are not destined to supersede the original German products.

10. The arylarsonate, "soamin," and sodium cacodylate, both clinically and serologically, have no place in the effective treatment of syphilis.

THE TREATMENT OF SYPHILIS.

The *British Medical Journal* of January 13, 1917, contains an article by SEQUEIRA on the present-day treatment of syphilis by certain combinations of arsenic supplemented by mercury. Let us for the moment consider the evidence which is in favor of this as opposed to the old mercurial treatment.

The best evidence is that which has been afforded us by Gibbard and Harrison in their valuable work in the military hospitals. It is impossible in civilian practice to carry out the continuity of observation which these officers have been able to obtain. Sequeira will not quote their figures at length, but he mentions that of 378 cases treated by mercury alone there were clinical relapses during the first year in 83 per cent, while of 152 cases treated by salvarsan and mercury the clinical relapses were only 3.9 per cent. This difference is so striking that it does not need comment. Gibbard and Harrison also showed by statistics the importance of early treatment, for in 70 primary and 130 secondary cases treated by modern methods the proportion of relapses, including both clinical and those only recognized by the blood test, was 11.3 when the treatment was begun in the primary stage, while it reached 33.7 when the treatment was postponed until the secondary stage.

A third point is the fact that the serum of a primary sore or of condylomata may be teeming with spirochætæ, as observed by dark background illumination, and within twelve hours of giving an injection of salvarsan or one of its allies no spirochætæ were found. Do not, however, look upon this as evidence of one dose of salvarsan curing a case. There is evidence to show that there may be both clinical and blood test relapses even after several injections.

The only way to effect a cure is to treat the patient sufficiently early. There are some cases in which, even after numerous courses of treatment, we are unable to effect a permanent change in the Wassermann reaction.

The arsenical preparations for intravenous injection fall into two groups, the types of each group being salvarsan (606) and neosalvarsan (914). The salvarsan group, to which kharsivan and arsenobenzol belong, are acid in reaction and require careful neutralization by a solution of potassium hydrate. The neosalvarsan group includes novarsenobenzol, novarsenobillon, and does not require neutralization. Galyl does not require neutralization. These drugs are dissolved in sterile saline solution.

The most recent introduction is Danysz's luargol, a combination of arsenobenzol with silver, bromine, and antimony. It is given intravenously in alkaline solution, but recently a soluble sodium salt has been made which is more convenient to use. It is too early to say more than that the results, so far, are very promising.

The next question of importance is, Shall the drug be in dilute or concentrated solution? There are many advocates for the administration of concentrated solutions. The advantage is that the injection can be made with a syringe containing 10 Cc. of the solution. If the operator is expert the injection of this small quantity of solution with a Record syringe is a simple matter. The needle is introduced into the vein and a little blood is withdrawn, showing that the vein has been entered, and then the solution is slowly introduced. The disadvantage is that without great care it is easy to pass the needle through the wall of the vein and to inject the highly concentrated solution into the connective tissue, a procedure which immediately causes intense pain, and, what is infinitely worse, a necrosis of tissue with ulceration which may take many weeks to heal. Sequeira therefore strongly urges that until a man has mastered the technique and feels quite sure of himself, he should use dilute solutions.

The dilute solutions are usually made up to 100 Cc. They are introduced either by gravity or by a pressure bottle. The gravity apparatus is preferred by many. It consists of two vessels, one containing normal saline and the other the solution. Two rubber tubes governed by stop-cocks lead to a single tube to which is attached the needle. It is usual to have a piece of glass tube as a window inserted in the rubber near the needle. The needle is introduced with the reservoirs at a low level, and as soon as blood appears in the glass window the apparatus is raised to about 4 feet above the patient. First a little normal saline is run in and then the solution, and finally a little more normal saline. The needle is then withdrawn, and the puncture covered with a pad and bandage.

In his clinic they employ a convenient appartus devised by McIntosh and Fildes. The solution is placed in a glass bottle with a rubber stopper through which passes one tube to the needle, while the air pressure in the bottle can be raised by a Higginson syringe, care being taken that the air passes through a tube plugged with cotton-wool. The apparatus, which is made by Messrs. Baird & Tatlock, is small and portable.

A two-way syringe drawing in saline first and then the solution is also in use.

In all intravenous injections the following precautions must be observed:

1. The urine must be tested before each injection.

2. The drugs are sent out sterilized, but the saline or distilled water and all the apparatus must be carefully sterilized.

3. Care must be taken that the drug is completely dissolved.

4. The site of injection must be well washed and then carefully cleansed with ether or painted with iodine.

5. The vein must be made prominent by applying a rubber tourniquet or band round the upper arm. Immediately it is known that the vein is entered the tourniquet or band must be released.

Sequeira prefers in all cases to give the patient a rest for a night after the injection.

Of 1120 consecutive injections given in his department the temperature rose above 100° F. in 149 instances—namely, 13.3 per

cent; of these, 29 reached 103° F. or over—namely, 2.6 per cent. The febrile reactions are met with chiefly after the first injection and mostly in the florid secondary cases. Other symptoms are slight shivering, with occasional vomiting and diarrhea. In rare instances a scarlatiniform rash occurs, apparently due to the drug.

In very exceptional cases, in the early days of the salvarsan treatment, he saw symptoms of meningitis. In a case under his observation the patient complained of headache on the third day after the second dose. This was followed by convulsions, and the patient died in coma on the fifth day. In these rare cases multiple small hemorrhages have been found in the meninges of the encephalon.

Another reaction is characterized by symptoms of nephritis, uremia, and suppression of the urine. These phenomena are believed to be due to renal inadequacy. A transitory jaundice may also appear, and in very rare instances toxic hepatic symptoms.

Pulmonary embolism has also been described. It has occurred as a sequel to thrombosis of the vein used for injection.

Much has been written on cranial nerve affections following injections of arsenical compounds. Seventh and eighth nerve paralysis has been observed. It is more probable that the paralysis is due to the syphilis, and cases are recorded in which a further injection has cured the condition. A transitory vasomotor crisis sometimes follows the injection, the face becomes swollen, congested, and sweating, the pulse rapid and dicrotic, and the patient complains of headache.

These considerations suggest the importance of carefully selecting cases. The following general conditions are held to contraindicate the injection of these drugs: (1) Renal disease of non-syphilitic origin. Albuminuria without casts may be due to the syphilitic poison, and Sequeira has several times seen it clear up after an intravenous injection. (2) Grave heart disease and (3) hepatic cirrhosis are also conditions in which it is dangerous to carry out the treatment.

The subsequent treatment of the patient by mercury demands a few words. The most satisfactory method is intramuscular injection. Sequeira uses a mercurial oil as follows:

> Mercury, 66 grains;
> Sterilized anhydrous lanolin, 4 drachms;
> Sterilized liquid paraffin, 6 drachms.

One grain of mercury is injected once a week. The oil may require warming, especially in cold weather, to allow it to pass through the needle. The site for injection is the outer third of a line drawn from the anterior superior spine of the ilium to the top of the gluteal cleft. Alternate sides are used for the injections. The needle should be 2 inches in length, and should be carefully sterilized before introduction, the site of injection also being cleansed with ether or painted with iodine. The needle is plunged vertically to the surface deeply into the muscle and the injection is made slowly. There is some subsequent pain, and the patient should rest for a little while after the operation. Sometimes there is difficulty in getting the patient to come regularly for these injections, and in such cases the inunction of one drachm of mercurial ointment daily should be ordered. The inunction is made into a soft part of the skin—for example, the sides of the chest, bends of the elbow, etc. The ointment must be well rubbed in, a quarter of an hour being allowed for each rubbing, and two rubbings should not be made consecutively in the same place. A course of thirty rubbings may usually be given, but if the gums show signs of mercurialism the process should be suspended.

A third method is to give Hutchinson's pill containing

> Hydrarg. cum creta, 1 grain;
> Pulv. ipecac, etc., 1 grain,

three times a day after food.

The first course of treatment should consist of three intravenous injections at weekly intervals, followed by eight intramuscular injections of mercury. At the end of two months the Wassermann reaction should be examined. In about 70 per cent of Sequeira's primary and secondary cases

it is negative at this period. The blood test should be made again after three months, and if it is positive, as is not infrequent, especially in secondary cases, the treatment should be repeated. At regular intervals the blood should be again examined, and further treatment given if required.

In all cases the patient receives a paper telling him how to avoid spreading infection, and is given instructions as to diet, especially abstinence from alcohol.

Treatment of Congenital Syphilis.—As a routine Sequeira prefers mercurial inunction, and a quarter of a drachm of mercurial ointment is rubbed into the abdomen once daily after bathing. A flannel binder is worn over the ointment. The mother should be treated if possible. The duration of mercurial treatment in the infant should be controlled by the Wassermann reaction. Intravenous injection in young babies is so difficult that it is rarely practicable. Treatment through the mother, if suckling, may prove satisfactory. The presence of snuffles sometimes prevents the child from suckling, and in such cases feeding by a spoon must be adopted.

Persistence of Blood Reaction.—One meets cases in which, in spite of repeated treatments, the Wassermann reaction cannot be rendered permanently negative, and the important question arises whether treatment should be continued indefinitely and whether such subjects should be allowed to marry. From the point of view of the public health we may say definitely that so far as our experience goes patients who have had these repeated courses and yet have a positive Wassermann reaction are not a source of infection, and we believe that it is safe for them to marry. Hutchinson's long experience showed that marriage was safe after mercurial pills for two years, when it is known that over 50 per cent of the cases would have a positive Wassermann.

Where the patient has a persistently positive reaction Sequeira thinks it is wise to give a short course of mercury at least twice a year.

TREATMENT OF ACHYLIA GASTRICA: SIMPLE OR BENIGN ACHYLIA.

In the *Glasgow Medical Journal* for January, 1917, MacLennan says that the medicinal treatment aims at stimulating the gastric glands to a better secretion. Bitters are sometimes useful, but alone are not sufficient. By far the most important therapeutic agent we possess is hydrochloric acid, more especially when it is combined with pepsin. If it be kept in mind that about three pints of gastric juice are normally secreted in twenty-four hours, and that hydrochloric acid is present in from 0.1 to 0.2 per cent, it will be seen that the dose of dilute acid must be very large. Indeed, it is not practicable to administer all the acid represented in the normal output. In cases of permanent total achylia the administration of hydrochloric acid must be as continuous as is the administration of thyroid in myxedema. But in all those in which the glands are not destroyed, but only functionally inactive, the patient's gastric contents should be tested at intervals to avoid the possibility of producing an artificial hyperchlorhydria. The dilute hydrochloric acid should be administered in one dose after the three principal meals. These should contain all the proteid material which is to be administered in the day's dietary. These three meals should be taken at five-hourly intervals. Starchy material should not form a large proportion of their contents. The carbohydrates should be partaken of in the intervals—three hours after each meal—and should, as far as possible, be eaten quite dry, and any fluid which may be desired taken when the solids are finished.

It will be found in practice that perhaps the best form for administration of the artificial digestive is:

> Acidi hydrochlorici diluti, ounce i-ij;
> Glycerini pepsini, ounce ij½;
> Extracti condurango liquidi, ounce j;
> Aquæ chloroformi, ad ounce vj.
>
> M. Sig.: Drachm ij, in water, thrice daily after food.

If any fermentation is evident, a small dose of resorcin may be added to the above.

Various other bitter tonics may also be tried from time to time during the treatment. Sometimes strychnine is useful, with or without physostigmine. In cases in which there is motor insufficiency, as in the achylias with gastroptosis, this combination will be found useful:

Strychninæ sulphatis, grain 1/24;
Physostigminæ salicylatis, grain 1/96;
Quininæ hydrochloridi, grain 1;
Extracti euonymi, grain ¼;
Gingerine, grain ¼.

M. Ft. pil. mitte tales, 60. Sig.: One pill thrice daily after food.

In the treatment of pernicious anemia we are too often content to administer arsenic alone, and to think that no further medicinal treatment is of any value. But much good can be done to prevent toxemia and improve the blood in proportion to our ability to remove the accompanying achylia or to compensate for its presence. Many of the severe gastrointestinal symptoms which so rapidly deteriorate the patient are due to the accompanying achylia. In all cases of pernicious anemia the treatment for achylia, in its fullest extent, should never be omitted. To the artificial gastric juice may be added an appropriate dose of the acid solution of arsenic.

RECTAL VS. VAGINAL EXAMINATION IN LABOR.

In the *American Journal of Obstetrics and Diseases of Women and Children* for February, 1917, MOORE states his belief that rectal examination *per se* has some advantages over the vaginal route, as the following will show:

1. Practically painless.
2. No danger of sepsis.
3. Easy to perform, as it does not require any preparation of patient or physician.
4. Can make any reasonable number of examinations with no danger of puerperal sepsis following due to the examination.
5. By more permissible examinations, progress of labor can be satisfactorily followed.
6. Rectal condition, as tumor noted.
7. Confirm emptying of rectum in labor, as scybalous masses may be present.
8. Can take plenty of time for the examination.
9. Certain uterine abnormalities recognized better per rectal route when seen late in pregnancy or labor, as the existence of a second non-pregnant horn of a uterus bicornis, which is usually situated posteriorly.
10. Peace of mind of the accoucheur during a fever in the puerperium, as also freedom from blame to the physician himself as far as a vaginal examination is concerned.
11. Fetal parts felt only by rectal route in certain uterine tumors, as fibroid on anterior surface of womb, or in backward displacement of the uterus.

Because of the possibility of introducing the thumb between the labia in a patient already prepared for delivery, it is best to use a sterile glove during a rectal examination. Short-fingered accoucheurs should certainly use the sterile glove. An ordinary clean glove might be employed by others. Mucilage of tragacanth should be used as a lubricant instead of vaselin, as the former is easily washed off the glove.

The areas near the so-called rectal valves should not be confused with the cervix.

Rectal examination alone is no competitor and cannot replace the vaginal route. Moreover the rectal exploration together with an abdominal examination in pregnancy and labor is too conservative. But notwithstanding that the latitude of possible error is greater in a small percentage of cases by the rectal route, he thinks that the trinity of methods, a vaginal examination in pregnancy, abdominal palpation in pregnancy, and labor with the employment of the rectal route in parturition, for all practical purposes, is a worthy substitute for the vaginal examination in labor.

The above combination of methods, however, should be subject to the following rule: When in doubt concerning the diagnosis of important conditions by the rectal route, resort immediately to the vaginal method. It might be said that as over 90 per cent of labors are normal, why use the vaginal route, except when an operative procedure is indicated. Is it scientific to

hobnob with chance and bed-fellow with luck? This is the age of preventive medicine, and many serious obstetric conditions can be avoided by the early knowledge on the part of the operator of the true situation before craniotomy is indicated. We should at all times keep in touch with the work, and by so doing avoid error as much as possible.

It appears to be a remarkable fact how little the rectal route is used either in maternities or in private practice. De Lee suggests its use to avoid frequent vaginal exploration during parturition, while Kerr remarks that "a rectal examination is rarely if ever called for in obstetric practice." Rectal examination, like the vaginal route, merely requires experience in order to recognize conditions. It is not a difficult method of diagnosis. Nor should the rectal route develop a timidity about making a necessary vaginal examination. It will probably make the obstetrician careful concerning unnecessary use of the latter method.

The writer has found the rectal route useful in the following conditions:

1. In conjunction with abdominal palpation in pregnancy and labor, and a vaginal examination in pregnancy for diagnostic purposes in parturition.

2. As an adjunct where the vaginal route is employed in labor, to avoid numerous investigations by the latter method, to note progress of labor, and possibly to discover the cause of delayed labor.

3. To get information concerning a gauze sponge left in the vagina after a perineorrhaphy. The bulging of the sponge is felt in the rectum.

4. To see in the puerperium if the uterus is retrodisplaced; to guide us in permitting early getting out of bed.

5. Routine rectal examination in pregnancy may discover a rectal carcinoma, pedunculated fibroid of the rectum, uterine tumors and abnormalities, etc. Cæsarian section is indicated in rectal carcinoma, as it is harmful to drag a child forcibly past such a tumor.

6. Observe advancement of the head during a pain, to note progress of labor.

7. To note whether the placenta, after detachment, lies in the lower uterine segment or vagina.

8. In delayed labor to note if spines of ischium are prominent.

9. After a forceps operation, in suspected cases, to see if spines of ischium or coccyx are fractured.

10. In "twilight sleep" the rectal route, usually causing little disturbance of the patient, can be employed to note progress of labor.

11. Using rectal examination combined with abdominal palpation in labor, the time for making the primary vaginal examination can be estimated.

12. Sometimes manual flexion of the head in delayed labor can be slightly corrected, thus helping anterior rotation.

13. Nurses understanding rectal examination can more efficiently watch the progress of labor.

His conclusions are as follows:

1. Rectal examination alone, nor when combined merely with abdominal palpation in pregnancy and labor, as a substitute for vaginal examination in parturition, is not compatible with an intelligent management of childbirth.

2. But the rectal route with abdominal palpation in pregnancy and parturition, and the vaginal examination in pregnancy, subject to the rule, "when in doubt . . . resort to the vaginal route," can be used in the majority of labors without necessitating any vaginal examination during labor. Keep out of the vagina in labor except when necessary to do otherwise.

3. Do a primary vaginal examination in all cases first seen in labor and in all cases of delayed labor, and of course where operative interference has been indicated.

4. Use the rectal route as an adjunct to a primary vaginal examination, thus avoiding numerous vaginal examinations, which should always be condemned.

5. Do the vaginal examination before rupture of the membranes, the cervix being dilated, as diagnosed per rectum, and get

the benefit of the autogenetic douche of liquor amnii.

6. Rectal examination and abdominal palpation in pregnancy and labor should be more thoroughly taught in medical schools.

INTRAVENOUS INJECTIONS OF ANTIMONY IN MALARIA.

The *British Medical Journal* of January 6, 1917, points out that since 1906, when Nicolle and Mesnil first recommended the use of antimony in trypanosomiasis, this drug has also been used in the treatment of dermal leishmaniasis, ulcerating granuloma, and Mediterranean and Indian kala-azar. To Broden and Rodhain belong the honor of having first devised the method of giving the salt intravenously, a procedure which got over the difficulty of oral and subcutaneous administrations. The results obtained in the different diseases mentioned have been satisfactory on the whole, but the difficulty of completely eradicating protozoal parasites is well known, and in trypanosomiasis, at any rate, relapses have not been infrequent even after several courses of antimony injections. Great success has followed intravenous injections of tartar emetic in that intractable form of ulceration known as "ulcerating granuloma of the pudenda," and what is known as dermal leishmaniasis in South America has also reacted very favorably. Following up these discoveries many different authors have employed such injections in kala-azar, the results obtained having been much better than by any previous method of treatment.

In a paper published in the *British Medical Journal* of January 6, 1917, Sir Leonard Rogers records a series of interesting observations on cases of malaria treated by tartar emetic injections. In two of these the injections caused crescents to disappear from the peripheral blood, and in another benign tertian gametes disappeared. Should it be proved that injections of tartar emetic will sterilize cases of malaria a great advance will have been made even on the quinine method, but, as Rogers indicates, a good deal more work and the lapse of a longer time will be needed to determine this point. The disappearance of the gametes alone will not, of course, effect a cure, for the active asexual forms must also be acted upon and killed off. New drugs have from time to time been brought forward for the treatment of malaria; in fact, there is a French one on the market now called "diemenal," a solution of colloidal manganese, which is said to cure malaria much more effectually than quinine, and also to prevent relapses. Time alone will show if such a claim is well founded, and the same must be said of antimony.

Rogers's observation is interesting, and may prove to be very important. The results of his own further observations will be awaited with interest, and doubtless the publication of his preliminary note will stimulate others to put this method to the test.

TREATMENT OF ABORTION.

Brodhead in the *New York Medical Journal* of March 31, 1917, states that in threatened abortion the woman should have absolute rest in bed, light diet, if possible the services of a trained nurse, the bowels should be emptied by gentle laxatives or enemas, and visitors should be excluded. With slight bleeding, even when there is no pain, he has usually ordered small doses of morphine, one-tenth grain three times a day. Viburnum is used very extensively, but the writer feels skeptical as to its therapeutic value. The ice-bag is also advocated, and is probably of some value, but morphine is the best agent at our disposal. When the bleeding is moderate or profuse, or when there is pain, a hypodermic injection of morphine one-sixth grain is given, and repeated according to the necessities of the case, enough being administered to relieve the pain. In Brodhead's opinion, vaginal packing should only be used when bleeding is profuse, or where the patient is bleeding moderately and is living at some distance from medical advice, for no one can foretell when a profuse hemorrhage may occur. He believes that the tampon, although

necessary in some cases, is very likely to cause dilatation of the cervix and hence hasten the abortion. He is aware that the tampon is considered by some to be valuable in the control of threatened abortion, but his experience leads him to believe it should be omitted, except under the conditions just mentioned. The amount and character of the bleeding cannot be considered an infallible guide in prognosis, for many patients bleed profusely and still continue along in pregnancy without further mishap. The patient should be kept in bed until at least several days have elapsed, with no bloody discharge.

When the abortion is inevitable and pregnancy has existed up to two and one-half months, we may tampon and wait for the completion of the abortion, or dilate and curette at once, or give a full dose of pituitrin (1 Cc.) and repeat after one hour, tamponing or curetting if this plan of treatment is ineffectual. He cannot agree with some authorities that all early cases of inevitable abortion should be curetted at once. Operative treatment in the hands of competent surgeons is safe, but many accidents such as perforation of the uterus and laceration of the cervix have complicated the usually simple operation of curettage, and septic infection not infrequently follows unskilful or careless work. Certainly in the hands of inexperienced men the use of the tampon is safer and is frequently attended with excellent results. In three instances where the patient has had no pain, he has used full doses of pituitrin with very gratifying success, and in a considerable number of this variety of cases in which there have been both pain and bleeding, he has had excellent results with pituitrin.

A patient four to four and one-half months pregnant entered the Harlem Hospital, having slight irregular pains which she had had for hours prior to admission. There was slight bleeding, and a central placenta previa was found; the cervix admitted two fingers. A hypodermic injection of 1 Cc. of pituitrin was given, and within an hour the uterus was emptied, the fetal sac being expelled intact. In any event the treatment can do no harm, and if a curettage can be avoided there is a distinct gain in following the procedure. When pregnancy has advanced beyond the third month we may await the completion of the abortion, give pituitrin, or tampon and wait for full dilatation or complete expulsion of the ovum. In some cases embryotomy or manual extraction of the fetus and placenta will be necessary. In this type of cases the emptying of the uterus is made much less difficult, if time has been allowed to obtain complete dilatation and softening of the cervix, or at least sufficient dilatation to enable one to extract the fetus and placenta easily.

ANESTHESIA AND ACIDOSIS.

SANDERS in the *New York Medical Journal* of January 27, 1917, directs that when the patient is returned to the warm bed he should have a pillow, unless shock treatment is required. The room should be quiet, darkened, and well ventilated. A retentive enema of one pint of a five-per-cent solution of lactose and sodium bicarbonate two per cent is given at once. Eight-ounce retentives of the same solution are given at three- to four-hour intervals. Quinine muriate in ten-grain doses, added to the first four of the enemas, prevents backache and gas pains. If preferred, the solution may be given by the drip method.

In cases of severe infection Hogan recommends a five-per-cent solution of anhydrous dextrose by the drip method, adding: "I have found the rectal or intravenous injection of sterile hypertonic anhydrous dextrose solutions—up to eighteen per cent—to produce most spectacular results in anuria, ileus, coma, persistent vomiting, and glaucoma."

As soon as the patient can take liquids by mouth, sips of sodium or calcium bicarbonate water should be given. Fruit juices with sugar added, forming a "fruitade," make them grateful to the patient. The sugar furnishes the additional carbohydrate needed, while the fruit acids are oxidized to bases constituting a further feeding of

alkali. Later, carbohydrate feeding may be increased by use of malted milk, cereal gruels, and then fruit albumen.

Pain and restlessness are relieved by the use of bromides, chloretone, and veronal. When vomiting does not occur, vigorous sugar alkali treatment should be pushed, and lavage with the alkaline solution practiced, if necessary. Sodium bromide or chloretone given per rectum is helpful.

A powder of cocaine one-fortieth grain, menthol one-tenth grain, tincture of nux vomica one minim, bismuth subnitrate one grain, and cerium oxalate two grains gives relief in some severe cases.

Some who have tried this treatment have reported that it did not give the results which its advocates have stated. Sanders believes this is because they have not fully followed out the really simple details of the technique as given above. He is sure this was so in a number of cases which he has observed.

SALVARSAN AND NEOSALARSAN IN SYPHILIS.

ORMSBY in the *Journal of the American Medical Association* of March 31, 1917, reminds us that when salvarsan was first used, warning was directed particularly against giving the drug to patients with disorders of the kidney, heart, vascular system, and eyes. With increased experience, few of the original contraindications have remained as such. Where organic changes have occurred in any vital organ, the treatment should be given with care and always initiated with a small dose.

In order to safeguard the patient to be treated with salvarsan, it is absolutely essential that the technique be correct. This includes the use of freshly distilled and sterilized water for making the sodium hydroxide, the sodium chloride, and the salvarsan solutions.

The initial dose should always be small: 0.1 or 0.2 gm. of salvarsan, or 0.2 or 0.3 gm. of neosalvarsan. Should an idiosyncrasy be present, serious results are thus avoided.

It is well to have the patient on a restricted diet immediately preceding the injection, and elimination should have been promoted by catharsis. In the absence of the contraindications noted, this procedure offers most promise for good results.

The remarkable clinical achievements of salvarsan need not be considered in detail. The rapid healing of infectious lesions of the skin and mucous membranes and the gain in weight and general health are too well known to need emphasis here.

As has been previously stated, a definite technique cannot be outlined, as the patient has to be considered individually, as well as the disease with which he is suffering, and the stage and severity of the latter. In a review of the enormous literature of the subject, the general trend now appears to be to give salvarsan and mercury in courses of from five to eight injections of the former and from twelve to twenty injections of the latter, repeating the courses at intervals of from six to eight weeks and as many times as appears necessary in individual cases. The method employed by Ormsby, which follows, is perhaps an average of that used in various parts of the world.

He divides his treatment into courses of from five to eight injections of salvarsan and twelve to twenty injections of mercury, or the equivalent of the latter in inunctions. The interval between salvarsan injections is from seven to fourteen days, while the mercurial injections are given every second day, if a soluble salt is used, and weekly if an insoluble salt is employed. The soluble salt usually selected is mercuric chloride, in dosage of one-fourth grain, and mercuric salicylate in dosage of from 1 to 2 grains.

In the chancre stage treatment is instituted with salvarsan, and one course is usually sufficient. Many of these patients have not developed a positive Wassermann and have remained free from symptoms for some years.

In active syphilis, mercury precedes salvarsan, to prevent neuro-recurrences, and three courses are given, with a rest of from six to eight weeks between courses. If after

the termination of these the reaction remains negative a year, a provocative treatment is given, when, if not followed by a positive reaction and the spinal fluid is found normal, a prolonged rest is given.

In tertiary and latent cases several courses are given, if necessary, together with potassium iodide.

In involvement of the nervous system, intravenous medication with salvarsan, together with intramuscular mercurial injections, precedes intraspinal medication. In the latter, Ormsby has employed only the Swift-Ellis method of injecting salvarsanized serum. He has not used the Ogilvie method of direct salvarsan injections, nor has he used intracranial injections. The latter methods have been efficient in the hands of others. He insists upon energetic treatment early, and believes that many of the failures are directly attributable to insufficient treatment. In a few selected cases he has employed the intensive method of Pollitzer with good results, but cannot accept it as routine.

In a recent report from the clinic of Professor Jadassohn (Bern), Nägeli states that 900 syphilitic patients were given 7000 injections of salvarsan and neosalvarsan with no fatalities and few reactions. The initial dose employed in this clinic is always small: 0.1 or 0.2 gm. of salvarsan and 0.15 or 0.3 gm. of neosalvarsan, and as a maximum dose 0.3 gm. in the case of women, and 0.4 gm. in the case of men, or 0.45 and 0.6 gm., respectively, of neosalvarsan. The absence of reaction in their cases is attributed to small dosage. The interval between injections averages one week, though in certain cases four days has been the interval. Injections of mercury, usually insoluble preparations, are added, and in certain cases potassium iodide also is used. They recommend repeating the dose before the Wassermann reaction becomes positive or before symptoms begin to develop.

Pollitzer gives three injections of large doses of salvarsan at twenty-four-hour intervals, followed by twelve mercurial injections. In secondary syphilis three courses are given, with two-month intervals between courses. In older cases treatment is continued until the Wassermann reaction becomes negative, and subsequent to this two courses are given. After a year of Wassermann reactions a provocative injection is given and an examination of the spinal fluid is made.

Nicolas and Moutot, in 9000 injections, covering a period of three years, had two fatalities. In the group were 200 cases of primary syphilis, the chancre being of from three to thirty days' duration. These were treated with four or five injections, at eight-day intervals, or with four injections, followed later by two more. Most had subsequent mercurial treatment. A few of this group had recurrences; two had reinfections. In secondary syphilis they record many recurrences after eight injections. Among the cases, in addition to the two fatalities, were many reactions, a few with coma or epileptoid seizures, and three cases of generalized exfoliative dermatitis, two cases of optic neuritis, and six of labyrinthitis.

Goubeau uses salvarsan, mercury, and potassium iodide in all cases. In primary syphilis he recommends excision of the chancre, forty-day treatment with injections of mercury benzoate, five injections of salvarsan, and lastly potassium iodide by mouth for forty days. Five or six cases were apparently cured by this method. In secondary syphilis, each period consists of five injections of salvarsan, followed by a series of mercurial injections, this being followed by a period of potassium iodide by mouth. He rarely gives more than two such periods. In sixteen of twenty-four patients, symptomatic and serologic cure was obtained. Eight had recurrences. In thirteen latent cases treated by this method, all the patients were serologically cured, with no relapses in two years. Patients with hereditary and nervous syphilis were improved.

In a recent contribution, Fordyce recommends the use of salvarsan and mercury in courses, each consisting of five or six injections of salvarsan, in dosage of from 0.3 to 0.5 gm. for men, and from 0.25 to 0.4 gm.

for women, at intervals of from one week to ten days, together with from twenty to thirty injections of a soluble salt of mercury, repeated daily or every second day, or from ten to twelve of an insoluble salt, repeated weekly.

In primary syphilis, before the Wassermann reaction becomes positive, two courses are given. In secondary syphilis, three courses are frequently necessary. In tertiary and latent cases, mixed treatment with potassium iodide and mercury is frequently added. In visceral cases he recommends salvarsan in small dosage.

Fordyce gives as criteria of a cure a negative Wassermann reaction for at least a year, continuing so after a provocative injection, and a normal spinal fluid, with certain exceptions. He urges energetic treatment in all cases.

THE TREATMENT OF GASTRIC ULCER.

In the *American Journal of the Medical Sciences* for April, 1917, SMITHIES gives this outline of his method of non-surgical treatment:

1. Rest in bed, both physical and mental, for from one to three weeks. Bodily and psychic activity stimulate peristalsis.

2. Rest to the stomach itself. When it is recalled that during an ordinary meal the digestive processes demand more than 2000 peristaltic waves, the effect of such a mechanical irritant to an ulcer or the ulcer-bearing area cannot be disregarded. Complete rest for the stomach also demands avoidance of irritating medicine, gastric lavage, and frequent abdominal examination of the suspected focus.

3. Local applications to the abdomen. Painful spasms are further prevented by having constantly applied to the abdomen compresses saturated with Ochsner's fluid (alcohol and boracic acid).

4. Keeping the stomach empty of food. This promotes healing by limiting local irritation from the food itself, from reducing the amount of gastric juice required to digest food, by limiting gastric peristalsis and avoiding painful gastrospasms which limit free circulatory interchange. The abstinence from food by mouth should be insisted upon for from three to seven days, according to the case. The period of fast is determined best by clinical disappearance of gastric spasm (pain, regurgitation, water-brash, heartburn) and by fluoroscopic proof of absent or diminished gastric peristalsis. During the fast paraffin wax is chewed for fifteen minutes every hour. It keeps the mouth clean, promotes free flow of protective saliva and mucus, counteracts painful hunger contractions and gastrospasms, and allays thirst.

5. Rectal feeding. During the fasting period, rectal feedings are instituted. From 500 to 1000 calories of nutrient mixture are given in twenty-four hours. Smithies uses a clyster containing 1 ounce of 50-per-cent alcohol, 1 ounce of glucose, with normal salt solution to make 240 Cc. The nutrient enema is given at body temperature by the drop method. The drops flow at the rate of 30 to 60 drops per minute. During the first day of rectal feeding, gtt. x of tr. opii are given with each enema.

6. When mouth feeding is begun. Usually from the fourth to seventh day. Two factors control the choice of diet: (*a*) nourishment should be liquid and administered warm in small quantities frequently, and (*b*) carbohydrates should be selected.

(*a*) Small quantities of liquid food should be frequently administered in order that the stomach empty rapidly with the least effort and thus remain food-free for the longest time, thereby giving maximum time of rest for ulcer healing. The duodenal digestion must be called upon until gastric conditions warrant demands being made upon stomach digestion. Keeping the stomach food-free keeps hydrochloric acid or pepsin production to a minimum. From 4 to 6 ounces of warm liquid are given every hour.

(*b*) As experimental facts have established, carbohydrate foods leave the stomach most quickly. Therefore, liquid carbohydrate mixtures (barley water, rice gruel, thin cream of wheat, thin creamed vegetable soup, etc.) are fed. Milk is not given as routine. Milk results in almost pure pro-

tein clots in the stomach. These act as do other proteins and remain for a long time in the stomach as a source of irritation, as stimuli to acid secretion and as choice culture media for bacteria. If milk be given at all, it should be first parboiled or predigested. Carbohydrate liquids produce the least secretion of HCl and pepsin and are weak stimuli of gastric peristalsis and impose the minimum of work upon the duodenum. It should be recalled that the pylorus opens only when the duodenal contents are neutral or alkaline. If the gastric contents are of such nature as to impose slight demands upon the stomach secretions and motility, the duodenum has little work as a neutralizer to perform and the pylorus remains free from spasm and opens readily. There are thus avoided gastric stagnation and accumulation of distressing free and combined acids, which prevent healing and which usually demand frequent lavage or the exhibition of large quantities of alkali.

7. Limitation of overproduction of gastric acid. This is obtained by keeping the stomach food-free as above described. This secondarily limits both the frequency and the strength of gastric peristaltic waves. Unless food leaves the stomach rapidly, gastric glands continue secretion and coincidentally stress of gastric peristalsis upon the pylorus keeps up constant irritation of ulcer-bearing areas.

If the above points established by modern physiological research are borne in mind, the exhibition of large quantities of alkali are unnecessary. Their use is certainly unscientific. Providing the gastric lumen is patent, the stomach empties freely. There is no stagnant, irritating, fermenting residue. Large quantities of alkali, according to Pawlow and to our clinical and laboratory experience, create pernicious increases of gastric acid and of mucus and generally demand relief by lavage. Moreover, we have shown that many gastric ulcer cases do not exhibit hyperacidity or hypersecretion. It is true that the stomach can neutralize large quantities of alkali if compelled to do so, but there is no physiological reason why it should be called upon to thus overwork. It will be remembered that the normal habitat of gastric epithelium is an acid or at the best a neutral medium. If these epithelial cells are called upon to live in an excess of alkali, they live, as it were, in the presence of a foreign body. Experiments in artificial tissue growth have shown that cell proliferation is retarded by hypertonic alkaline solutions. Hence, overalkalinization may prevent healing. Attempts at protection from this foreign body (excess alkali) are shown (1) by the acid-producing glands oversecreting, and (2) by the mucoid degeneration of physiological fatigue which results in the throwing out over the secretory glands of a protective layer of mucus. The vicious circle thus formed results in enormous secretion of acid and mucus and is doubtless at least a partial explanation of the so-called hypersecretion associated with gastric ulcers, particularly when such are treated by the overalkalinization method. To combat this condition of affairs the patient's stomach must be washed frequently or greater quantities of alkali must be given in order to overpower the stomach's defensive mechanism and produce fatigue or exhaustion of the acid-secreting mechanism. It is a common observation that those patients who are treated for ulcer by the overalkalinization procedure always require frequent gastric lavage in order to insure their comfort. This frequent lavage is to be condemned not only on account of its disagreeable features, but because it acts contrary to the primary requirement of healing, namely, rest of the affected part. It is quite evident to those who have watched the behavior of a stomach by means of fluoroscopic screen when a tube is inserted into it that gastric lavage defeats this primary principle of healing. Lavage is generally accompanied by vigorous gastric contractions that persist not only during the maneuver but often for a long time afterward. If dieting is arranged on the carbohydrate basis, alkali is given in only sufficient quantities to keep the stomach slightly acid or neutral and to neutralize the duodenum, thus aiding in pyloric relaxation; gastric lavage need rarely be insti-

tuted during the entire course of a patient's treatment. In the past five years Smithies has not employed lavage therapeutically in ulcer cases more than a dozen times. Lavage is so rare a procedure in his clinic that his associates and patients consider such an order as almost contraindicated. It is readily judged how a treatment of which lavage does not form a prominent feature contributes much to a patient's peace of mind and shortens the period of hospital incarceration.

8. Medical treatment. It is doubtful if any form of medicine has a direct healing effect upon peptic ulcer. Medicines are administered largely to counteract discomfort due to three main causes, namely, (*a*) painful gastrospasm, (*b*) accumulations of overacid gastric contents associated with peristaltic unrest, (*c*) pain associated with perforation.

(*a*) Painful gastrospasms are usually controlled by carrying out the dietetic principles which Smithies has above mentioned. The chewing of paraffin wax relaxes the pyloric spasm largely through stimulating a proper swallowing reflex and by fatigue of hunger-like contractions. Certain types of case in which there is an individual vagus hypertonia, or when ulcers are located at or near the orifices, demand the exhibition of antispasmodic medicines, such as atropine, tincture of belladonna, or bromides. In the early stages of the treatment, when the stomach is being kept as free as possible of contents, atropine may be given hypodermically or bromides may be placed in the nutrient enemata. Later, when food is being given by mouth, tincture of belladonna in doses of from 5 to 15 drops may be administered fifteen minutes before feeding from three to six times daily. Smithies has not found useful, as analgesics, the exhibition of large doses of such "protective" medicines as bismuth and olive oil. These medicines doubtless act by affecting the rate and intensity of peristalsis, although they may have some effect in proved cases by direct action upon the ulcer. At times orthoform, given in 10-grain doses, in warm water, is an efficient local anesthetic when it is able to come in direct contact with an open ulcer.

(*b*) For the relief of overacid gastric accumulation, sodium bicarbonate is contraindicated, because its administration results in the production of annoying accumulations of carbon dioxide with resultant gastric retention or painful belching, and because its neutralizing value is comparatively low. Large quantities of bicarbonate of soda are necessary to give relief, and the administration of such secondarily produces excessive gastric secretion. If alkalies are indicated, better results are obtained by the exhibition of frequent small doses of milk of magnesia or calcined magnesia. The ordinary case is very comfortable when from five to ten grains of calcined magnesia are given every two or three hours. Many cases require no exhibition of alkali if the physiological principles above outlined form the basis of the treatment. Only in very extreme cases is it necessary to employ gastric lavage. When it is employed, warm Carlsbad water (1 drachm of artificial Carlsbad salts to 1 quart of water) may be satisfactorily administered. Usually the exhibition of atropine or belladonna for the relief of gastrospasms exerts a definite effect toward controlling oversecretion of acid gastric juice.

CLINICAL EMPLOYMENT OF THE PORCELAIN FILTER.

In the *New York Medical Journal* of March 31, 1917, McGURN states that the filter which he has employed in the intravenous administration of salvarsan and neosalvarsan for the past four years and the one he describes as of the Pasteur type, has a filtering surface two and a quarter inches long and a circumference of four and a half inches. The wall of the tube is about one-eighth-inch thick and of sufficient porosity to negotiate 500 Cc. of salvarsan or normal salt solution in ten minutes, with a gravity of but twenty inches, while a nineteen gauge needle is distally attached. Its outlet consists of a glazed, constricted extension, which serves as a

suitable male portion for the flexible slip-joint needle attached.

The material used in the production of this filter consists largely of kaolin, or North Carolina clay, which is first passed through a fine metallic screen having 140 meshes to the linear inch. The clay is then mixed with other physical ingredients to render it more plastic and again screened, after which it is subjected to several processes of sedimentation, steaming, drying, etc. It is then molded, bored, and placed in a kiln, where it is baked at a temperature approaching 2500° F. or 1371° C.—determined by color tests and pyrometric cones—for twenty-four hours, and allowed to cool gradually for a much longer period before being "drawn." The constricted portion of the tube is then dipped by the glazier and refired. The tube is firm, hard, and white, but not fragile. It has a porosity that permits the passage of most of the smaller types of microörganisms, but it is impervious to bodies one-third the size of the red blood-corpuscle. These filters are unaffected by acid or other chemicals and can be used over and over again. When their surface becomes foul or plugged after prolonged severe usage they can be revivified by brushing the surface with pumice or carborundum.

The limited purpose for which this special tube was first intended was to serve as a final filter in the intravenous administration of liquids, especially that of salvarsan, to insure against the possibility of extraneous matter of any kind reaching the general circulation. It has been shown after prolonged use, however, that ampoules of neither salvarsan nor neosalvarsan, when mixed with distilled water or chemically pure saline solution, are productive of complete chemical solution, and always contain bodies that appear in residue when such a filter is employed.

A few of the facts favoring the use of the porcelain filter are: (1) The filter can be successfully combined with any apparatus furnishing positive pressure or gravity of twenty or more inches. (2) Salvarsan or neosalvarsan cannot be produced in pure chemical solution until it has passed a filter that would prove impervious to bodies one-third the size of red blood cells. (3) The transparency of a liquid is sorely lacking in proof of its chemical solution. (4) It affords protection against insoluble bodies of any kind reaching the general circulation and is an important safeguard against the retention of salvarsan. (5) It is impossible for air to pass the filter. (6) It provides against the possibility of neosalvarsan entering the vein when precipitated from its solution, either by partial oxidation or by excessive dilution with saline solution. (7) Patients are favorably impressed with the painstaking means by which their lives are protected from technical dangers. (8) With proper handling the filter and its parts are practically indestructible. (9) Only ten minutes are required for administration of 500 Cc. of solution, which permits gradual blending of the salvarsan with the blood-stream. (10) All insoluble irritants are removed from the solution, so that spasm of vein and its consequent stasis of salvarsan is never met with when the porcelain filter is employed.

THE TREATMENT OF TUBERCULOSIS WITH CYANOCUPROL.

In the *New York Medical Journal* of March 24, 1917, OTANI states each organ reacts differently to cyanocuprol, and smaller doses must be administered when the more sensitive organs are affected. The affected organs can be arranged in the following order according to their sensitiveness: kidneys, larynx, pleura, peritoneum and intestines, bladder and urethra, lungs, testicles, joints, and other surgical cases. The cerebral and cardiac membranes seem to be more sensitive than the kidneys. In more serious cases, as well as in those that have widely affected areas, smaller doses must be given. The doses depend upon the clinical course of the disease. A smaller dose than usual must be given when the patient has an active form, while a larger one may be given to a stationary case.

Smaller doses than usual must be administered to cases with malnutrition and anemia. If pulmonary hemorrhage, pain in the chest, dyspnea, rapid pulse, frequent coughs, or neurasthenia occur, smaller doses must be given. They must also be given to patients with high fever. For a chronic case with complications, the size of the dose must be determined by examination of the heart. A small dose must be given in pregnancy.

The age, weight, and constitution should also be considered in the choice of the dose, but the same dose may be administered independently of the size of the patient. To patients over sixty and to infants, an adequate reduction in the size of the dose must be made. Patients at puberty are apt to suffer from an active form of tuberculosis, and consequently great care should be taken. To women somewhat smaller doses should be given than to men. During the winter, or when the climate is unsettled, small doses must be given.

geal tuberculosis. Surgical tuberculosis should also be treated with a larger dose than pulmonary tuberculosis.

The method of determining the size of the second and subsequent doses is as follows: The drug acts differently in different individuals, and its efficacy can, therefore, only be determined with great care. The second and subsequent doses can only be determined by observing the results of the first injection.

1. If a given dose produces a marked reaction or the reaction does not subside after the third day, the dose is too large and a considerable reduction must be made in the size of the next dose.

2. If a suitable dose has been given, the patient will not have any reaction; if a reaction is produced, it will subside completely in a few days, and improvement will be observed to set in within two weeks. In cases of this kind the same dose should be administered at the next injection.

3. The size of the suitable dose of cyanocuprol becomes smaller and smaller, and therefore, unlike other drugs, the dose must never be increased.

4. A very large dose sometimes has no effect. The dose should never be increased, even if no reaction or improvement is observed.

5. If the same dose is given several times in succession, the patient will show no improvement, in spite of the efficacy that set in at the beginning. This is due to the fact that the adequate dose has become less.

STANDARD SIZES OF DOSE.

Affected organs.	General condition.	Temperature.	Severe symptoms	Clinical course.	Dose Cc.
Lungs,	Good.	Normal.	None.	Quiescent.	7.0
	Good.	Normal.	Present.	Quiescent.	5.0
first stage.	Fair.	Below 38° C.	None.	Moderate.	6.0
	Fair.	Above 38° C.	None.	Active.	4.0
Lungs,	Good.	Normal.	None.	Quiescent.	6.0
	Good.	Normal.	Present.	Quiescent.	4.0
second stage.	Fair.	Below 38° C.	None.	Moderate.	5.0
	Fair.	Above 38° C.	None.	Active.	4.0
Lungs,	Fair.	Above 38° C.	None.	Very active.	3.0
	Good.	Normal.	None.	Quiescent.	5.0
third stage.	Good.	Normal.	Present.	Quiescent.	3.0
	Fair.	Below 38° C.	None.	Moderate.	3.0
	Fair.	Above 38° C.	None.	Active.	2.5
Larynx.	Good.	Normal.	None.	Quiescent.	5.0
Intestines.	Good.	Normal.	Present.	Quiescent.	3.0
Pleura.	Fair.	Below 38° C.	None.	Moderate.	3.0
Peritoneum.	Fair.	Above 38° C.	None.	Active.	2.0

The figures in the table have been chosen for adult cases on the basis of the precautions given above. They are intended only to show the standard size and should be varied in practical administration. If the case in question should be affected in more than one organ, the size of the dose must be determined by the severer affection or more sensitive lesions.

Tuberculosis of the kidneys is not given in the table; it should be treated with a dose twenty per cent less than that of laryn-

In such a case a smaller dose will produce better results.

6. If the given dose is considered too small, the size should not be increased, but the same dose should be continued, because the adequate dose will be gradually reduced and the right one will finally be reached.

7. The size of the dose must be decreased immediately if pulmonary hemorrhage, pleurisy, etc., should develop, or if the temperature should rise, the weight be reduced, or the disease should take an active form.

8. If such a reduction in the size of the dose is considered necessary, it must be diminished by ten or twenty per cent of the former dose. But if pleurisy, peritonitis, or laryngeal tuberculosis develops, still greater decrease is necessary.

9. This decrease is not necessarily made with each injection, but depends upon the reactions and the efficacy of the dose administered.

10. Some cases show great improvement after one injection, all the symptoms subsiding at once, but this lasts only for seven to ten days, and the symptoms then reappear. Temperature, râles, and laryngeal pain are the ones that usually subside temporarily. The size of the dose should never be increased; after the same dose has been given several times, improvement begins to set in.

THE TREATMENT OF INFLUENZA.

Writing in the *New York Medical Journal* of March 24, 1917, BROWN states that in the treatment of the catarrhal type of influenza, considering as the primary problem the destruction of the organism, it has as the result of long experience been determined that the drugs which are most useful and efficacious are quinine and the salicylates—salol, salophen, salicylic acid. A careful study of the antigrippe mixtures and capsules which are commonly used by practitioners practically determines the purpose of these drugs as basic constituents, and we must depend largely on these substances to destroy the infective organism. The other ingredients contained in the grippe capsules or mixtures are usually incorporated for the control of symptoms, such as phenacetine or some other coal-tar preparation as an analgesic. If the catarrhal symptoms are excessive, camphor is added. If the type is severe and the headache intensive, he substitutes acetanilide for phenacetine. If accompanied by a cough or respiratory irritation, he prescribes codeine, morphine, or dionin. When acetanilide is prescribed, however, it is advisable to combine with it caffeine as a cardiac stimulant to counteract the depressing action of the coal tar. In other words, starting with the salicylates and quinine as the primary factors, the other ingredient must be introduced to meet the symptoms presented in each individual case.

In the enteric form, while still incorporating the basic principles of quinine and the salicylates, it is usually necessary to emphasize the opiates, preferably in the form of deodorized tincture of opium or powdered opium, to control peristalsis. In the rheumatic type, the coal-tar derivatives with caffeine should be emphasized in order to relieve the pain. In the cerebral or nervous type, while still emphasizing the basic and primary treatment, it is often necessary to prescribe the cerebral sedatives, such as bromide, chloral, etc., to control the excessive symptoms, and in severe cases spinal tapping may be resorted to.

In our efforts to treat and relieve the symptoms of this disease, we often overlook or minimize the fact that many of the complications, sequelæ, and active symptoms are directly dependent upon the presence of a toxin, and it is to this feature that Brown wishes especially to call attention in the treatment of the disease. He does not think that high colonic irrigations, the drinking of large quantities of alkaline waters, and the introduction of large quantities of sodium bicarbonate are utilized sufficiently. There is every indication of the presence of an active toxin. General practitioners have a tendency to adhere to the drug therapy and ignore the treatment of the mucous membranes with silver

nitrite, argyrol, etc., while the prospects of destroying the organism are well within possibility.

The generation of an antibody is a matter of great importance in the treatment of influenza and is usually neglected. Under this head Brown would call attention to forced feeding and the use of arsenic, strychnine, and nux vomica, and possibly vaccine. The mixed vaccine in the hands of Wright, Allen, and others seems to have been efficacious. But if the vaccine is used for this purpose, it must necessarily be a mixed vaccine. Brown does not see where much harm can be done by the use of this plan of treatment, but he does not think it should be advocated as a general procedure in every case of influenza. It would seem reasonable, however, under certain circumstances and in the hands of careful observers, to try the vaccine treatment in the severer forms of influenza.

Prophylaxis in the treatment of this disease is more important than in many of the minor contagious diseases from which we are so carefully protected by the sanitary experts. From his experience Brown believes that influenza is responsible for more destruction of life than any of the milder epidemics of the contagious diseases. Any effort to isolate the patient or to destroy his secretions and excretions is seldom made. The patient should be urged to use paper napkins or gauze for nasal and respiratory excretions, and the destruction by burning of all these substances should be insisted upon. We should also isolate the patient from the other members of the family, and as the intestinal tract undoubtedly contains infective media, the excreta should be disinfected. If more attention was paid to this feature in the treatment of influenza the number of cases in epidemics would decrease by thousands. Among the sources of infection and places to be avoided are crowded street-cars, subway trains, moving-picture houses, theaters, and churches. Brown thinks very much more serious consideration of prophylaxis should be undertaken in these epidemic and semi-epidemic outbreaks of influenza.

OBSERVATIONS IN A SERIES OF CASES OF TWILIGHT SLEEP—A REPORT OF FIFTY CASES.

In the *Virginia Medical Semi-Monthly* of March 23, 1917, RUCKER and MASON reach the following conclusions:

1. The method is safe from the standpoint of the mother.

2. When properly administered there is no danger to the child.

3. It is the best procedure for alleviating pain in the first stage of labor.

4. Inhalation anesthesia is necessary in the perineal stage in the majority of primiparæ.

NOTE ON THE USE OF PHYLACOGEN IN PUERPERAL SEPSIS.

In the *Lancet* of March 10, 1917, REYNOLDS states that he thinks the following two cases may prove of interest to those who are so unfortunate as to run up against puerperal sepsis, and are not near enough to a laboratory to have a vaccine prepared, or cannot wait for it:

A patient, aged twenty-six, married, a strong, healthy primipara. On December 12, 1913, she had been in labor some hours before Reynolds was called, and was disappointed in her nurse, but was satisfied to have the services of a friend whom he found sitting on the bed clad in a greasy old fur motor-coat. It subsequently transpired that she was waiting to go into hospital with a view to operation, the history suggesting tubal mischief. Reynolds at once borrowed the nurse from another case near-by, who was perfectly satisfactory, and the confinement took place in a normal manner. Only two examinations were made, one on first seeing the patient, and the other after the liquor amnii was expelled. On the third day the pulse became more frequent, on the next the temperature started to rise, and intra-uterine douches of peroxide were given twice daily. In spite of these and other measures, the disease ran a severe course, and on the thirteenth day a clot was detached from the placental site during douching and lodged in the lower lobe of

the left lung. She collapsed at once, and began to cough violently, later on bringing up bright blood and mucus. That decided Reynolds to try mixed infection phylacogen, and he was able to inject some that afternoon. The symptoms improved with astonishing rapidity, and on the fourth day of the injections the patient was not only out of danger, but well on the way to recovery.

Patient, aged thirty, married, primipara. Five days before confinement, which occurred recently, her nurse brought her to Reynolds and called his attention to a mammary abscess. This was opened at once and swabbed out with chloroform. It healed before the confinement, which started with vomiting and weak pains which died away. Several small abscesses were noted on the buttocks and were painted with tincture of iodine. After twenty-four hours the patient had a frequent and weak pulse, so she was given an injection of morphine and atropine, which induced a few hours' sleep; food could then be taken. The pains set in more vigorously, but were not very strong, and as soon as the os was sufficiently dilated the membranes were ruptured, allowing the escape of a large amount of liquor amnii. Pains became more vigorous and the head reached the vulva, but after an hour so little progress was made that the child was delivered by forceps; its weight was 10¾ pounds. Reynolds had to wait three-quarters of an hour for the first pain after that, and expressed the placenta, as with the pain there was free hemorrhage. It came away entire. From the first day the temperature was elevated, and well within twenty-four hours the lochia were offensive. Much the same treatment was followed out as in the previous case, but on the seventh day, as the temperature reached 102° F., Reynolds decided to use phylacogen again, and started injection on the following morning. After two injections all untoward symptoms ceased, and on the third day the patient's condition was that of a woman who had had a normal labor.

These are the only occasions on which Reynolds has needed phylacogen. The first case was losing ground till it was used, and the result was wonderful. In the second case the patient, like the first, was a strong woman, but in this case he had the advantage of an excellent nurse. There is no doubt in his own mind that this was a case of primary inertia which passed into secondary. It is true that the symptoms were not nearly so severe, as she never had a rigor, although she felt very cold the day before he used the phylacogen. Still, the fact remains, as her chart shows, she made no real improvement till the phylacogen was used, and he was nervous about her, because, rightly or wrongly, he looked upon the case as an infection before delivery—a condition he had never seen before.

THE CONSERVATIVE TREATMENT OF DISEASES OF THE NASAL SINUSES.

VANSANT in the *New York Medical Journal* of March 24, 1917, states that in carrying out these measures a thorough, careful examination and an accurate diagnosis are of the first importance. Certainly a maxillary sinus suppuration caused by the root of a decayed tooth or a molar abscess extending into the sinus does not call for a sinus operation, but rather for removal of the tooth and appropriate treatment. A sinus suppuration, even with necrotic bone, caused by syphilis, requires medical rather than surgical interference. Sinusitis associated with one of the exanthemata, or even influenza, calls first for improvement of the general condition and conservative treatment of the sinusitis. In sinusitis caused by the mineral poisons, phosphorus, etc., the removal of the patient from exposure to the mineral poisoning is necessary. A subacute or chronic catarrhal sinusitis should not be mistaken for an empyema. A maxillary sinus suppuration caused by pus descending from a frontal sinus should be handled by treatment directed to the frontal sinus rather than by extensive operation on the maxillary sinus. A thorough, careful, and accurate diagnosis is therefore a most essential feature of a conservative treatment. Any attempt to treat a sinus inflammation

and suppuration without surgical operation on the sinus must be based on well-established medical and surgical principles, and these are: (1) drainage and ventilation must be established; (2) pus must be evacuated; (3) the underlying causes must be removed.

Let us consider first the establishment of drainage and ventilation. We find in many cases that drainage from the sinuses is interfered with and prevented by intranasal causes. The principal intranasal causes are deflections of the nasal septum, enlarged turbinals, nasal polyps, and a turgescence of the nasal mucosa. A deflected nasal septum may completely or partially block the outlets to the nasal sinuses, so as to cause complete or partial obstruction to drainage from the sinus involved. In such a case the removal of the septum obstruction is clearly indicated rather than a sinus operation. A greatly deflected nasal septum also gradually causes atrophic and septic changes in the unobstructed nostril, leading to a sinus involvement. Here again a straightening of the septum is the proper method to be pursued. Nasal polyps may so retain pus in the sinus that all efforts to relieve the condition fail until the polyps are removed, and drainage established. An inflammatory turgescent condition of the turbinals and nasal mucosa frequently accompanies a sinus discharge. This swollen condition interferes with the drainage from the sinuses and must be relieved. This condition of the turbinals and nasal mucosa is perhaps the most frequent cause of obstruction to drainage from the normal outlets of the sinus. In treating it we can obtain temporary relief and drainage from the local application of drugs that contract the nasal tissues. Among such drugs, cocaine and adrenalin are preëminent. Another method of considerable importance is the use of absorbent cotton plugs saturated with solutions of the non-irritative silver preparations, the solutions being preferably made in glycerin. These plugs, after a weak cocainization of the nose, are placed between the swollen turbinals and the outlets of the sinuses; they excite a copious mucous discharge from the nose without irritation and greatly reduce the congestion, thus giving a better drainage from the sinuses. At times a partial or complete turbinectomy is necessary to secure drainage. Hot-water applications placed over the face and forehead also help to relieve the nasal and sinus congestion, and often give relief from pain. At times cold applications are more beneficial than hot ones. The internal use of certain of the coal-tar products seems to have a beneficial action on the inflammation of the sinuses and often is of great service in relieving pain. Another helpful measure that frequently aids in opening the normal outlets of the sinuses is the forcible injection of thin streams of heated air across or against the normal outlets. This has a very penetrating power and can be forced into small interstices, thus frequently opening the obstructed normal outlets to the cells and sinuses, which then usually remain open; thus drainage is aided.

Retained pus must be evacuated. This can at times be done successfully by syringing the sinuses through their normal outlets with various fluids and injecting various medicaments. An accessory ostium may greatly facilitate this procedure. When the normal openings of the sinuses are inaccessible we can, particularly in the case of involvement of the maxillary sinus, use a trocar and cannula and thus inject the fluids into the sinus, removing the retained pus. This may be followed by injections of medicaments having a beneficial effect upon the mucosa. Again, position of the skull will help to remove pus from some of the sinuses. A patient with a suppurating maxillary sinus will aid drainage by lying down with the affected side uppermost. Also, when blowing the nose, the pus may be more easily removed by bending forward and turning the affected side upward. Another valuable method to secure evacuation of pus from the sinuses is the use of suction apparatus. The nasal chambers should first be treated by cocaine and adrenalin and then the evacuation of pus aided by the suction apparatus. Compres-

sion may be used alternately with suction; this gives in some cases excellent results.

We must remember that a sinus suppuration is at least a local septic process, and it must be treated as such. Frequently we find the patient suffering from general conditions, associated with, or due to, local sepsis. More or less anemia is usually present. Extension of the infection to the chest, causing bronchial conditions, more or less chronic, is frequent. Digestive disturbances are often associated with the sinus disease. The many disturbances affecting the eyes and vision have been the cause of much medical discussion. Pain in the head in various locations, according to which sinus is affected, is a symptom requiring careful diagnosis and treatment. We are also becoming more aware that kidney complications, obscure nervous conditions, and affections of parts far removed from the local focus of infection in the sinuses are frequently present.

THE MODERN TREATMENT OF DIABETES MELLITUS.

LEYTON in the *British Medical Journal* of February 24, 1917, recognizes that the causes of diabetes mellitus are not known, but thinks it will assist us to understand its modern treatment if we adopt a speculative explanation of its cause, even if this subsequently be proved incorrect. Diabetes mellitus includes at least three conditions:

1. Sugar in the urine with an increase in the sugar in the blood.

2. No sugar in the urine (at times) with a considerable increase of sugar in the blood.

3. Sugar in the urine without any increase of sugar in the blood.

The two conditions first named are in Leyton's opinion due to an altered nerve control of the pancreas, whilst the third is due to the production of a phloretin-like body in some of the tissues.

If the patient be suffering from any other disease which is likely to lead to dissolution during the next few months he should not be asked to undergo the discomfort of alimentary rest because the recompense for the self-denial is too small.

Leyton's experience has taught him that, in spite of the fact that not infrequently a patient suffering from rapidly progressive pulmonary tuberculosis may lose the sugar in the urine as the disease progresses, nevertheless cases of diabetes complicated by pulmonary tuberculosis are not suitable for treatment by the Allen method.

Every effort must be made to be certain that the patient is not suffering from active tuberculosis. We all know that often it is extremely difficult to make up our minds on the diagnosis even when uncomplicated; when diabetes is present the difficulty is increased ten times. Many of the more delicate tests prove fallacious.

The rise of temperature with exercise will not necessarily take place in a diabetic. Tuberculin may not be used because any man who awakens quiescent tuberculosis in a diabetic is guilty of manslaughter.

The examination is limited to inspection, palpation, percussion, auscultation, and radiography. Even the most careful and experienced may err when limited to these methods of examination. When examination of the sputum proves the presence of acid-fast bacilli nothing more need be said.

Other forms of infection must be sought for and dealt with as far as possible before treatment is begun.

Especial attention should be paid to the gums; pyorrhea alveolaris is extremely common in diabetics, possibly because they have a poor resistance to most infections. In several cases removal of infected teeth and treatment of the gums without any modification in diet has led to the disappearance of even high percentages of sugar from the urine.

It is wise to remember that very severe cases of very long standing require a slight modification of the routine treatment.

Patients of no education who have not been taught control are unsuitable. They prove a trial to their physician and do not keep to the diet after they have left the institution in which they have been treated.

The physician must use judgment and

remember always that a patient who begins the Allen treatment and does not continue it is worse off than if he never attempted it.

The method of persuading the patient to undergo the treatment must depend upon the temperament of the patient. The doctor who has seen many cases which have been pronounced hopeless become free from sugar and return to their normal work will feel justified in painting the future upon the old treatment in its true colors. Perhaps any one with but little experience may not feel justified in doing this, because he is afraid of frightening his patient.

When a patient has consented to undergo the treatment he will ask, "How long shall I have to go without food?" An answer to this question is not easy. It is quite certain that the length of the period does not depend upon the percentage of sugar in the urine.

Leyton is under the impression that the greater the percentage of sugar in the blood the longer the fast required; in all probability future experience will show that this has many exceptions. Some months ago two cases were admitted upon the same day—a girl of sixteen passing 12.3 per cent sugar in the urine, and a woman, aged thirty-five, passing 1.25 per cent sugar. The blood of the young girl contained 0.15 per cent sugar, whilst that of the woman contained 0.5 per cent sugar. The girl's urine was free from sugar after alimentary rest for forty hours, whilst the woman had to fast six days before the glycosuria disappeared.

If the patient has developed diabetes comparatively recently a diet poor in fats is ordered for two days preceding the period of alimentary rest. This may consist of the same diet as the patient has been accustomed to with the exclusion of butter and fat meat.

Usually Leyton orders a breakfast of weak tea with very little milk, two eggs with a small piece of bread; lunch of 100 grammes of lean meat, 200 grammes of cooked cabbage, 60 grammes of boiled potatoes, and a small baked custard pudding. Dinner, a plateful of clear soup, 120 grammes of cooked green vegetable, an egg, and an orange. In exceptional cases of very long standing and severe acidosis it is wiser to diminish gradually the protein and carbohydrate after removing the fat before submitting the patient to alimentary rest.

Leyton warns us against giving a favorable prognosis to patients who come with a history that for years they have passed sugar in the urine and carried on their work in comfort until a few weeks ago, when they began to be tired and to lose weight and become rather more thirsty than in the past. This sudden alteration often indicates the awakening of tuberculosis; tuberculosis in diabetics may take months to show signs.

During the period of alimentary rest the patient receives a Seidlitz powder every morning, and if that does not prove sufficient it is supplemented by castor oil or an enema. He is kept in bed, but allowed to leave it for the morning bath and for calls of nature. It has been asserted that the sugar disappears more rapidly from the urine when the patient is allowed to take exercise; this assertion is not easily proved, and even if it were established beyond doubt, one would have to weigh the relative advantages of shortening the period of alimentary rest and the complete control over the patient. In Leyton's opinion complete control is the more important.

The patient should be shielded from all worries and annoyances. Diabetics are short-tempered, and therefore every device must be adopted to meet their wishes whilst under treatment.

During the period of alimentary rest the patient is allowed at breakfast time 200 Cc. of weak coffee without milk or sugar, and 100 Cc. of clear broth made with an eggspoonful of meat extract which is poor in protein. At lunch he receives the same as for breakfast. At tea, 200 Cc. of weak tea. At dinner, 200 Cc. of weak tea and 100 Cc. of clear broth. As much water and soda water as desired is permitted. If the patient is accustomed to alcohol, he is allowed the usual amount unless it is really excessive. If not accustomed to any, then

alcohol should be given only in cases of severe acidosis or extreme emaciation.

Leyton advises us most strongly to note down every detail, even as to the method of preparing tea and coffee, otherwise one will find his patient being given solutions of sugar, burnt and unburnt, instead of coffee.

The twenty-four-hour specimen starting from 8 in the morning is tested for sugar at 8:30 every morning with Benedict's solution, or with the indigo test; when it is found free from sugar, we conclude that the metabolism of the patient has altered, and the following progressive diet is begun:

The first day after the urine is free from sugar the diet should contain 5 grammes of carbohydrate; this might be given as a quarter of an ounce of white bread, but that would not be satisfying, nor would it tend to alleviate constipation. A vegetable containing a considerable quantity of cellulose and a little carbohydrate is chosen in order that the pangs of hunger may be assuaged by the bulk of the meal, and at the same time the intestine stimulated by the residue of the food.

When in season French beans are the most convenient, because they contain less than 2 per cent carbohydrate, and 250 grammes would be allowed on the first day. When French beans are not obtainable, cabbage boiled in three waters and then stewed in a little clear broth may be used as a substitute; or, if the patient is unable to eat cabbage, 230 grammes of cooked spinach, or 200 grammes of raw lettuce, or 140 grammes of celery may be substituted.

The urine is examined every morning, and, if free from sugar, the diet for the day is given.

First Day.—Breakfast: Weak coffee 200 Cc., cooked French beans 75 grammes. Lunch: Weak coffee 200 Cc., French beans 100 grammes. Tea: Weak tea 200 Cc. Dinner: Weak tea 200 Cc., French beans 75 grammes.

Second Day.—The quantity of vegetable is doubled, and three eggs are added to the diet.

Third Day.—200 grammes of lettuce replace 200 grammes of French beans, and another 200 grammes of French beans are replaced by an equal quantity of boiled cucumber.

Fourth Day.—200 grammes of cabbage boiled in one water replace 200 grammes of cucumber.

Fifth Day.—30 grammes of lean meat are added to the diet along with 200 Cc. of clear broth.

Sixth Day.—Breakfast: Weak coffee 300 Cc., with thin cream 10 Cc., one egg, and raw lettuce 200 grammes. Lunch: Lean meat 100 grammes, cooked French beans 200 grammes, boiled potato 40 grammes. Tea: Weak tea 300 Cc., thin cream 10 Cc., one egg. Dinner: One egg, cooked cabbage 100 grammes.

Seventh Day.—A fast day.

Eighth Day.—30 grammes of cooked fat bacon replace 30 grammes of lean meat.

Ninth Day.—30 grammes cooked fat bacon replace 15 grammes of lean meat, 15 grammes of boiled potato added.

Tenth Day.—30 grammes of fat added.

Eleventh Day.—Breakfast: Weak coffee 300 Cc., thin cream 15 Cc., one egg, cooked fat bacon 30 grammes, raw lettuce 200 grammes. Lunch: Cooked lean meat 20 grammes, fat 15 grammes, cooked French beans or their equivalent 120 grammes, boiled potato 60 grammes, butter 15 grammes. Tea: Weak tea 300 Cc., cream 15 Cc., boiled potato 30 grammes, butter 15 grammes. Dinner: Clear broth 200 Cc., one egg, cooked cabbage 100 grammes, cooked French beans 100 grammes, butter 30 grammes.

Twelfth Day.—Add fat 30 grammes.

Thirteenth Day.—Add white bread 15 grammes, subtract raw lettuce 120 grammes. Add white bread 15 grammes at tea, and subtract 30 grammes of potato at lunch. Add butter 15 grammes.

Fourteenth Day.—A fast day.

Fifteenth Day.—Breakfast: Coffee 300 Cc., cream 20 Cc., one egg, cooked fat bacon 30 grammes, raw lettuce 100 grammes, white bread 15 grammes, butter 15 grammes. Lunch: Cooked lean meat 60 grammes, fat 30 grammes, cooked French beans 120 grammes, boiled potato

30 grammes, butter 60 grammes. Tea: Tea 300 Cc., white bread 15 grammes, one egg, butter 30 grammes. Dinner: Clear broth 200 Cc., one egg, cooked cabbage 120 grammes, boiled potato 30 grammes, butter 60 grammes.

The diet on the fifteenth day represents carbohydrate 42 grammes, protein 54 grammes, fat 192 grammes. Note that the carbohydrate is fairly well divided: breakfast 12 grammes, lunch 8 grammes, tea 9 grammes, dinner 13 grammes. The energy provided by the diet is calories 2112, sufficient for an average man who is not doing any manual work. If sugar remains absent the diet is altered by the addition of 3 grammes of carbohydrate daily with a diminution of 6 grammes of fat.

Every seventh day should be a fast day or a half-ration day; in the milder cases half-ration days suffice.

Under no conditions should we be influenced by the old-fashioned idea and add to the protein in the diet; if one does this, quite frequently sugar will return, and one may think that it is due to the increase in carbohydrate and diminish it in error. This means that no so-called antidiabetic bread or biscuits may be given.

When Leyton wishes to reduce the weight of obese patients he gives them an excess of protein; this applies to diabetics too—an excess of protein causes them to lose weight. Many years ago Leyton found that by substituting cellulose, which is not absorbed, for protein, patients stopped losing weight.

There is nothing gained by giving oatmeal instead of bread; as long as the carbohydrate is starch and not sugar its absorption is fairly slow; the type of starch makes no difference.

Various diets suggested during the last few months have the same underlying idea, although the authors of the diets frequently do not seem to recognize it—namely, the diminution in the quantity of protein.

The problem arises, What should be done when the sugar returns? The patient should fast until the sugar disappears; as a rule twenty-four hours suffice. Then one of two methods may be adopted: the progressive diet may be followed, but at double the previous rate, until the carbohydrate reaches two-thirds of that at which sugar returned, and then fat is added until the necessary amount of energy is being taken. Or the diet is halved, then the protein is rapidly increased up to the amount it was when sugar appeared and the fat increased at the same time. The carbohydrate is gradually increased until it reaches two-thirds of the amount that led to the return of sugar.

We must realize that protein and fat in excess will both lead to the reappearance of sugar in the urine.

The reappearance of sugar after some time without any alteration in the diet does not necessarily mean that a fresh period of alimentary rest need be prescribed, or even that a modification in the diet is essential. Some emotional disturbance may have led to glycosuria. Amongst Leyton's patients is a woman who has a return of glycosuria whenever the interval between letters from her son, who is fighting in France, is more than five days. Mental perturbation does not always lead to the same results. A severe case of diabetes, whose carbohydrate limit rose to 60 grammes of carbohydrate, had bombs dropped in his garden on two occasions; he lost his brother, sister, and wife, all within three months; but he did not have a return of sugar.

Exposure to cold, anxiety about catching a train, and many other minor things may lead to the return of sugar, and should be inquired about before any alteration in diet is ordered.

In olden days much attention was paid to the weight of the patient, and the unwarrantable assumption was made that so long as the weight was maintained all was well with the patient. Patients should be taught that the weight is of comparative unimportance, that no diabetic has ever faded away. Make them exchange an interest in weight for one in the result of the test of the urine with Benedict's solution.

As a rule the gain in weight when the patient is upon the optimum diet is very

slow, perhaps a few ounces a week. In the majority of cases a rapid increase means that edema is developing. An exception came Leyton's way a short time ago in a man who had gained 17 pounds in six weeks. For two years he had been upon the old-fashioned treatment, and had become a skeleton, and a weak skeleton at that. The death of his medical adviser had led to his adoption of the Allen treatment. He emphasized the rarity of the rapid increase in weight with completely beneficial results by making a somewhat unusual remark: "My doctor died; if he had not, I should."

In the past diabetics were not allowed to take much exercise, because it was thought that exercise would lead to loss of weight. It is found that a moderate amount of exercise allows the patient to metabolize more carbohydrate, and exercise is now ordered; the amount taken should be the same every day, otherwise it must be remembered that upon those days when less exercise is taken less carbohydrate must be included in the food.

The results obtained are better than those by any method adopted to date. We must remember that the treatment is not a cure, but that when carried out in the best possible manner a diet is found which allows the patient to live indefinitely, and to lead a useful life. Perhaps a cure will be discovered during the next few years which will allow us to permit the patients whom we have kept alive to return to a normal diet.

The treatment has not been in use long enough for us to have decided whether the carbohydrate tolerance gradually increases. In some cases Leyton believes there are indications of this.

Young people who have developed the condition comparatively recently derive the most benefit from the treatment.

Of the seventy cases of severe disease which have come under Leyton's observation, four have died from tuberculosis. These led him to exclude those who showed signs of that condition. He hopes shortly to record what he believes to be the most satisfactory treatment when tuberculosis is present.

One patient died from pneumonia, two from gangrene which had started some time before they came under treatment. Four patients died within a day or two of admission to the hospital.

The majority are enjoying good health, and many are asking why they were not put upon the treatment a long time ago.

ARTIFICIAL PNEUMOTHORAX: A PLEA FOR PARTIAL COMPRESSION OF THE LUNG.

In the *Southern Medical Journal* for February, 1917, HENDRICKS states in an article on this topic that after measuring his experience and severely criticizing all literature on the subject, he determined to try to obtain the same results by partial compression that he had obtained, and that others have obtained, by complete collapse. He finds that the clinical symptoms disappear in most cases as readily in partial collapses as in complete collapses. He finds that the patient's general condition improves in turn just as readily. He also finds that the sputum is reduced just as surely, but not so quickly. He has cited the results in hemorrhage cases by the use of light compression. He also notes that by partial compression the activity of the lung is greatly limited, thereby producing more than an appreciable immobilization without rendering that lung unfit for the performance of its function at a future time.

The disadvantages of partial collapse are few. They are as follows:

First, refills are necessary more often.

Second, these patients must be studied and examined very closely, both by physical examination and the fluoroscope, in order to determine the time for refills.

Third, the frequency of the refills requires only that one be careful of his technique, as the more often the pleura is entered, the more liability there is to infection, air embolism, and pleural shock. Air embolism and pleural shock scarcely need be taken into account, because air embolism will not

occur if the air is not turned on unless the oscillations of the manometer so indicate. Pleural shock is prevented by local anesthesia. The only thing left then is infection; and here again medical men doing this operation must become modern surgeons in the strictest sense of the word.

Hendricks is quite in accord with the view that there are cases in which nothing less than complete collapse will suffice. Fortunately, however, since he has resorted to partial collapse he has encountered no such cases.

The advantages of this method are:

First, the results are the same clinically.

Second, partial collapse may be used alternately in either lung or at the same time in both lungs, if the case so demands.

Third, there is less tendency to pleural effusions.

Fourth, there is very little strain thrown upon the right heart.

Fifth, there is no disturbance of the mediastinum.

Sixth, there is less danger of spontaneous pneumothorax.

Seventh, there is less danger of rupturing an abscess into the pleural cavity.

Eighth, when the disease is arrested we have the unaffected portion of the lung performing its function.

For the reasons already set forth as well as the highly satisfactory clinical results obtained, Hendricks can see no reason for other than partial collapse of the lung except in extreme cases.

EPIDEMIC VAGINITIS IN CHILDREN.

RACHFORD (*American Journal of the Medical Sciences,* February, 1917) states that the methods ordinarily used for the differentiation of the gonococcus from other forms of epidemic vaginitis have not been sufficiently perfected to make them absolutely reliable. Vaginitis is recognized as one of the most prevalent affections in our large cities, this being especially true in hospitals and other institutions which care for female children. The collective report of a committee to study this subject indicates that the disease is on the increase and suggests that the means in vogue for the cure of this disease and preventing its spread are quite unsatisfactory. The disease very rarely is conveyed to adults. Transmission is almost never by sexual contact. The time required for a cure varies from six weeks to six months. A large proportion of apparently cured cases exhibit relapses. Complications and sequelæ of epidemic vaginitis in children are much less common than gonococcus complications and sequelæ in the adult.

The simpler methods of treatment, such as irrigating the infected parts once a day with two parts of a normal saline solution, followed by the injection of 2 or 3 ounces of a 1-per-cent solution of nitrate of silver, are more efficacious than the more severe forms of treatment involving the direct application of strong astringents and antiseptics to the vaginal vault and neck of the uterus. The intractability of the cases in the hospital wards is largely due to reinfection.

TREATMENT OF SYPHILIS OF THE CENTRAL NERVOUS SYSTEM.

WALKER and HALLER (*Arch. Int. Med.,* 1916, xviii, 376; quoted in the *American Journal of the Medical Sciences,* February, 1917) report 75 patients with central nervous system syphilis treated with 450 intraspinal injections of salvarsanized serum and with 350 intravenous injections of salvarsan. At first only salvarsan intravenously was used, and a few patients improved rapidly. However, in many cases little or no improvement followed from three to six injections, so these patients were then given intraspinal salvarsanized serum in conjunction with the salvarsan, and they improved rapidly under the combined treatment (Swift-Ellis method). As the intraspinal treatment seemed to reënforce the salvarsan the authors desired to determine what results would follow the intraspinal method alone. For this method they selected patients with a negative Wassermann reaction in the serum and with positive findings in the spinal fluid. The

results from this method closely paralleled those from the double method. Therefore, the following rule has been adopted at the Peter Bent Brigham Hospital: Patients are first treated with intravenous salvarsan. If satisfactory results do not follow three or four such treatments, they are then given intraspinal salvarsanized serum in conjunction with intravenous salvarsan. Those who have a negative reaction in the serum are given only intraspinal salvarsanized serum.

To thirteen patients were given five or more intravenous injections of salvarsan alone. Four of these patients, three with cerebrospinal syphilis and one with syphilitic meningitis, had very recent infections and were relieved of their symptoms. The remaining nine patients had older infections, and they showed little or no improvement in their symptoms and no improvement in the spinal fluid findings. To thirty patients were given three or more double (Swift-Ellis) treatments, and marked improvement followed in each case. Thirteen patients who were previously incapacitated were restored to working capacity; of eighteen with ataxia, eight were relieved, five were markedly improved, and five more were much improved. Seventy-five patients showed improvement in the spinal fluid Wassermann reaction; in ten cases this amounted to from 0.3 to 0.5 Cc., and in five other cases the reaction became negative with 1 Cc. The spinal fluid cell count became five or less in twenty-five cases.

In four cases a period of two years has elapsed since treatment without any return of symptoms, in three others a period of eighteen months, and in eight others six months or more. Four patients have shown some form of relapse. One with tabes had a relapse in ataxia, two with general paresis of the insane had a temporary relapse in mentality, while one with cerebrospinal syphilis developed a weakness in the legs probably of cerebrospinal origin.

Seventeen patients were treated intraspinally with salvarsanized serum alone, and all were markedly improved or relieved symptomatically. Nine who were previously unable to work were restored to working capacity. Of the seven patients with ataxia, four, previously unable to work at all, became able to work, and in the other three in whom the ataxia was not so marked there was great improvement. The Wassermann reaction in the spinal fluid became negative with 1 or 2 Cc. in eight cases, and in five others it was improved from 0.3 to 0.5 Cc. The spinal fluid cell count became normal in nearly every case. Two patients with syphilitic meningitis were relieved in every way. Seven patients have been observed twelve months since treatment was stopped, and four others for six months or more, and they show no return of symptoms. One patient with cerebrospinal syphilis had a return of headache after eight months, and two with tabes had a slight relapse in ataxia, which rapidly cleared up immediately following a treatment. In one patient a provocative Wassermann reaction occurred in the spinal fluid following the administration of salvarsan, and in two cases a provocative reaction occurred in the spinal fluid following intraspinal treatment. Two patients with repeatedly negative reactions in the serum while under intraspinal treatment developed a positive reaction in the serum about the time the spinal fluid reaction became negative with 1 Cc.

Improvement in symptoms following treatment seemed to parallel fairly closely the drop in the cell count, and those patients with high cell count seemed to improve and the cell count dropped more rapidly than occurred in those cases with low cell count. The only physical sign which was changed in these cases was that a positive Romberg in one case became negative. More benefit seemed to follow moderate after-treatment reactions than when no reaction occurred. Severe reactions are undesirable and may be avoided by less frequent treatments. In this series of cases no fatal or disturbing results followed treatment. The total number of cells in the spinal fluid did not vary as a rule. In a few cases of tabes, during severe crises of pain, and in cases immedi-

ately following too frequent and too large intraspinal injections of salvarsanized serum, the cell count temporarily increased.

In their conclusions the authors state that patients with recent syphilitic meningitis and cerebrospinal syphilis may be relieved symptomatically by intravenous salvarsan; the spinal fluid Wassermann reaction may become negative with 1 Cc. and the cell count may become normal. Patients with long-standing cerebrospinal syphilis and tabes may be benefited symptomatically following salvarsan intravenously, but little or no change occurs in the spinal fluid findings. Patients with recent and those with late syphilitic meningitis, cerebrospinal syphilis, tabes, and general paresis of the insane are markedly improved following the combination of intravenous salvarsan and intraspinal salvarsanized serum (Swift-Ellis method), and those who fail to improve under salvarsan alone do improve both in symptoms and in spinal fluid findings following this double treatment. That intraspinal salvarsanized serum greatly benefits patients with central nervous system syphilis is shown by the fact that those with negative serum reactions and with positive spinal fluid findings are symptomatically relieved by this treatment. In many patients the spinal fluid Wassermann reaction becomes negative with 1 Cc., the cell count becomes normal, and a negative (Noguchi) globulin test is obtained following sufficient treatment with salvarsanized serum intraspinally without other medication.

SURGERY OF THE BILE PASSAGES.

GIL (*Surgery, Gynecology and Obstetrics,* February, 1917) summarizes the cases of biliary lithiasis treated in the surgical clinic of the Hospital of Medellin, drawing the following conclusions:

Calculus of the gall-bladder or in the cystic duct cannot produce icterus.

The icterus which appears with colic, or a little later which disappears totally and does not return unless with colic, signifies the passage of a calculus.

Persistent icterus of varying intensity, but most intense during colic, and which partly disappears, signifies obstruction of the common duct by calculus.

Persistent icterus each day more intense and accompanied by colic signifies complete obstruction of the common duct by retained calculus.

Persistent icterus without a history of painful crisis or subsidiary symptoms, and which is not accompanied by colic, signifies compression of the common duct most commonly by a tumor of the head of the pancreas.

With regard to the gall-bladder, the author reaches these conclusions:

In obstruction of the cystic canal the gall-bladder is distended, the bile which it contains is resorbed, and the inflammation increases the quantity of mucus. There is easily observed external tumefaction, sensible on palpation, but there is no icterus nor liver hypertrophy.

If there is grave infection the contents become purulent; the dilatation and external tumor progressively increase; there is great sensibility, muscular resistance, and hepatoxic fever.

In partial or complete obstruction of the common duct, the gall-bladder being healthy and the cystic duct permeable, the liver increases in size and the gall-bladder distends. Sometimes in this way an enormous tumor reaching to the iliac crest is formed. However, in the great majority of cases (80 per cent) the gall-bladder has previously been the site of a chronic inflammation and on this account is commonly small.

With symptoms of obstruction of the common duct the gall-bladder appears contracted in 80 per cent of cases of biliary lithiasis, and dilated in 90 per cent of cases of compression by tumor.

All the above conclusions are of great value in differential diagnosis.

Surgical treatment according to the author is indicated (1) in frequent attacks of colic; (2) in dyspeptic disturbance produced by lithiasis; (3) in cases of dilatation of the gall-bladder by obstruction of the cystic duct; (4) in complications,

vesicular empyema, vesicular rupture, etc.; (5) in recurrent cases; (6) in cases of chronic icterus by common duct obstruction, within certain limitations, however; (7) in cases in which the diagnosis is obscure and exploratory celiotomy is desirable.

The indications for cholecystostomy are: (1) when the gall-bladder is relatively healthy and the cystic duct permeable; (2) in cases of empyema and angiocolitis if the passages are permeable; (3) when the gall-bladder is much inflamed and adherent and the patient unfitted for a radical operation.

Indications for cholecystectomy are: (1) when the gall-bladder is the site of severe inflammations and is adherent, contracted, and the mucosa ulcerated; (2) when the gall-bladder is contracted upon a calculus and the cystic duct obstructed; (3) in certain cases especially in order to cure an external fistula; (4) in association with choledochostomy or hepatostomy when imperative.

BLOOD CHEMICAL METHOD IN THE ESTIMATION OF RENAL FUNCTION.

GRADWOHL (*Urologic and Cutaneous Review*, February, 1917) refers more particularly to the work of Folin and Denis, Benedict and Lewis, and others, using colorimetric determinations and dealing with small quantities of blood, which he states are easy and speedy. There are three substances of special interest regarding kidney function, namely, urea nitrogen, uric acid, and creatinin. The normal amount of total non-protein nitrogen per 100 Cc. of blood is 25 to 30 grammes; of urea nitrogen 12 to 15, of uric acid 1 to 3.0, and of creatinin 1 to 2.5. Urea comes from food (exogenous) derived from the nitrogenous portions of the food, some of which is stored up as amino-acids, others being converted into ammonia and eliminated. Uric acid is partly endogenous and partly exogenous, about half and half. Its derivation from food can be traced from purin, a conversion into xanthin, and finally to uric acid, it being diaminoized before change to xanthin takes place. Creatinin is entirely endogenous in origin; it is constant hour by hour in blood and is not increased at all by protein food intake. Uric acid is the most difficult to eliminate; urea stands next in point of difficulty of elimination, and creatinin is the easiest for the kidneys to get rid of. Expressed in numerical terms, it takes twenty times more work for the kidney to eliminate its urea than its creatinin.

In uremic nephritis we see the very highest concentration of these ingredients. The quantities of these ingredients in blood stand in no relationship at all to the presence of pathologically formed substances in urine such as albumin, casts, or urea.

We assume that the cause of the severe symptoms in nephritis is impending or advancing uremia, and that the cause of the uremia is resident in deficient elimination through kidneys. Whether the ingredients in blood which we are analyzing represent the substances themselves that produce the toxic symptoms, or whether they are simply an index of the toxemia, is of but little importance for the purpose in hand. We have in an analysis of this kind the surest method of determination by laboratory methods of deficiency in kidney function.

The elimination of kidney function by determination of the ease and speed with which a chemical dye can be eliminated through them seems somewhat rash, in theory and in practice. The author confines his remarks more particularly to the functional tests of Geraghty and Rowntree, for of all the color-producing substances that are used in kidney functional tests it seems to be the most commonly used because of the ease of administration, the harmlessness of the procedure, and the rapidity of making the test and obtaining the data required. Within certain limitations it gives a fairly good picture of kidney function, still it manifestly cannot give the observer the same intimate picture of metabolic processes and real kidney efficiency or deficiency which goes with a complete blood chemical analysis.

The work of Folin, Fitz, Frothingham and Denis, on "The Relation Between Non-

protein Nitrogen Retention and Phenolsulphonephthalein Excretion in Experimental Uranium Nephritis," gives a very good view of the exact value of each method of investigation from a purely experimental standpoint. These experiments showed that there was a wide difference in the figures of the phthalein test and the blood chemical data; that at the beginning of the nephritis the phenolsulphonephthalein elimination dropped more rapidly than the accumulation of non-protein nitrogen and urea of the blood. During the course of the disease the height of the nitrogenous accumulation is reached from two to three days later than the lowest level of the phenolsulphonephthalein excretion. Non-protein nitrogen and urea accumulated in the blood and returned to normal gradually, in these rabbits, as recovery of the kidney occurred. These observers maintained that in general these two tests parallel each other, but with this essential difference: the amount of phenolsulphonephthalein excretion showed the kidney function at the moment; the amount of non-protein nitrogen and urea in the blood is rather a measure of an accumulating difference between the amounts of waste nitrogen produced in the metabolism and the amounts eliminated by the kidneys. The time element, the duration of the condition, constitutes therefore a most important factor in the comparison of these two tests. The phthalein test indicates the function for the moment, the blood chemical tests indicate the true grade of the working power of the kidneys. There are many cases with little or no phthalein excretion that are badly deficient and would show high retention of these non-protein nitrogenous blood constituents; we know also that there are some cases with decreased phthalein output that are functionating quite well, viewed in the light of the non-retention of these ingredients of blood; we also know that there may be a normal phthalein output and a marked retention of the blood constituents.

There are records showing extensive changes in kidneys without urinary change; very definite retention of urea, uric acid, and creatinin. Other data show that in the presence of a rather low phthalein output kidney function may be unimpaired so far as retention of the non-protein nitrogenous constituents is concerned.

Occasionally hyperfunction, however, may accompany severe disease and may be very misleading. Foster called attention to the high figures of phthalein output in persons dying with uremia. Unfortunately, the investigators who have worked with these various methods have failed to make sufficiently searching researches upon all the important blood constituents.

The author emphasizes the necessity of determination of the percentage of uric acid in early interstitial nephritis. As pointed out by Fine, possibly the earliest indication of interstitial nephritis is the retenton of uric acid. We know that this retention of uric acid is characteristic of gouty conditions, of course, a retention that is of a permanent nature. Fine called attention to the similarity in the findings in gout and early chronic interstitial nephritis. As the case progresses in severity, we find the urea nitrogen accumulating; and lastly, in the extreme stages, we find an accumulation of creatinin. Creatinin accumulations, therefore, indicated severe kidney derangement of function. The striking fact first called to the attention of the profession by Myers that a creatinin retention of 5 mgms. or over indicates a probable early fatal termination of the case, deserves special consideration at the hands of a surgical group, such as are urologists. In Myers's experience, no individual who has attained a figure of 5 mgms. or over of creatinin has ever recovered. We have, therefore, in this one blood constituent a most important prognostic guide and one that should be earnestly investigated in daily work. In one case was found a very high degree of creatinin retention—over the fatal point—and a normal phthalein output.

Another factor which the author believes ought to be considered is the estimation of sugar in the blood. Since the use of the modern microchemical methods of blood-sugar estimations it has been found that

conditions of hyperglycemia and glycosuria do not go hand in hand. We may have glycosuria without hyperglycemia, notably in renal diabetes. We may have glycosuria and hyperglycemia, and again we may have hyperglycemia without any glycosuria. The threshold point in blood-sugar accumulation before glycosuria appears is generally stated to be in the neighborhood of 0.18 per cent, yet we have a record of a case of diabetes mellitus under starvation with 0.20 per cent blood sugar and no glycosuria. The particular point which the author wishes to make is that there is often a concomitant hyperglycemia with nephritis without any glycosuria, and that this excess of blood sugar indicates a complicating diabetes mellitus which must be reckoned with in considering operative risks and in forestalling acidosis. Blood chemistry must be looked to, therefore, with respect to sugar analysis in the broadest consideration of the metabolic conditions of these surgical cases.

TOXICITY OF THE PRESENT SUPPLY OF SALVARSAN AND NEOSALVARSAN.

ARMSBY and MITCHELL (*West Virginia Medical Journal*, January, 1917) report on the variations of the German importation of 1916.

The water used is distilled in Jena glassware from distilled water furnished by the Consumers' Company. Each morning the water is distilled and collected in Jena flasks of 500-Cc. capacity. The flask is capped with gauze, then put over the flame and kept there until the boiling point is reached, after which it is set aside to cool. The water remaining is redistilled on the following day. The sodium hydroxide solution is prepared in small quantity, at frequent intervals, from chemically pure sodium hydroxide and redistilled water, in a sterile Jena glass Erlenmeyer flask, which is stoppered with rubber. Before the preparation of the salvarsan solution, all the glassware is carefully sterilized and then rinsed with redistilled water. The neutralization is accomplished with minute care. The water is used in dilution, representing 0.1 gm. to each 25 Cc.

The authors were struck by the vasomotor phenomena accompanying or following the injection as soon as they began to use the new supply of salvarsan. In a few seconds after the flow of the solution into the vein had begun, the patient complained of a strong and sickening odor of ether. Marked generalized erythema, and in some cases urticarial wheals, appeared, as did lacrimation, with some respiratory embarrassment and a feeling of constriction about the chest. The pulse also became rapid and weak. In a few cases there was nausea and vomiting. The reaction lasted from one to three hours, the nausea for twenty-four hours. Six patients thus reacted. The entire quantity of salvarsan was returned to the New York agents in exchange for other ampoules. The reactions continued with the new lot, although much less frequently.

Neosalvarsan was then substituted. In the department of dermatology and syphilis at Central Free Dispensary of Rush Medical College a group of sixty-three patients was given 127 injections of salvarsan. In this group there were twenty-eight severe reactions, consisting of slight nausea, with occasional vomiting, after leaving the dispensary and during the night. The most toxic ampoule found was marked B. M. B., and all of the severe reactions occurred with this control mark. The dosage was in all cases 0.4 gm. or less.

The new shipment of neosalvarsan was found to be much less readily soluble than the former product and tended to form a gelatinous mass when added to the water. As a rule it became necessary to triturate the mass before it would go completely into solution. In two cases urticarial wheals followed each injection. Some of these patients had received numerous injections of other arsenical preparations without reactions. Nearly all now complain of the increased odor and taste which occur immediately after the flow begins, and which in some cases continue for twenty-four hours. The technique of salvarsan consists

in adding a full dose to 30 Cc. of water prepared as described and injecting by a gravity method. Epinephrin, though it can do no harm, is apparently without value.

CARREL'S METHOD OF TREATING INFECTED WOUNDS.

An excellent summary of this method is given by STRUTHERS (*Edinburgh Medical Journal,* February, 1917). The value of eusol and other preparations of hypochlorous acid is now generally recognized in the treatment of infected wounds. Excellent results have been recorded with the former both by continuous and intermittent applications of the antiseptic to the wound surfaces.

Desfosses (*La Presse Méd.,* Nov. 30, 1916) describes the details of the technique employed by Carrel:

The first step in the technique in cases of badly infected wounds is to open up freely the wound and all its recesses, to extract foreign bodies, and to excise necrosed or putrefying soft parts. After mechanical cleansing of the wound the object of the method is to sterilize the wound surfaces by the more or less continuous application of a suitable antiseptic, which is brought into intimate contact with all the raw surfaces. Solutions of hypochlorous acid or of hypochlorites, such as Dakin's solution, can render an infected wound aseptic, destroying the organisms without injury to the cells of the tissues. Formerly, surgeons employed antiseptics which were either too strong or too weak to be effective, and the duration of their application has been too short to destroy the organisms. Lavage of the wound is therefore the essential feature of Carrel's method. The effect of the treatment can be judged by the clinical features of the case and by bacteriological examination of the secretions from the wound.

The lavage of the wound may be continuous or intermittent, the hypochlorite solution being brought in contact with all the surfaces and corners of the wound by means of fine perforated rubber tubes. As the amount of fluid used is small no special arrangements are necessary to collect the fluid, which is absorbed by the dressings or evaporates. Intermittent lavage is more commonly employed than continuous irrigation by means of the drop method.

Red rubber tubes, with an interior diameter of 4 mm. and with walls of 1 mm. in thickness, should be employed; it is necessary for the tubes to be flexible and sufficiently resistant to avoid occlusion by pressure of the soft parts. The length of the tubes varies from 15 to 40 cm. Some are closed at one end by a ligature, and are perforated with numerous small openings for a distance of 5 to 15 cm. from the closed end. Eight small holes should be allowed for every 5 cm. of the tube, and these should be ½ mm. in diameter. The simplest way to perforate the tubes is by means of a punch of 2 mm. diameter. Other tubes are kept open at both ends, the central part only being provided with holes, and the fluid enters the tube at either extremity. In some cases it is advisable to have the perforated tubes surrounded by a layer of absorbent gauze. While the perforated tubes are kept in uniform lengths a tube can be lengthened, when desired, by joining to an additional piece of rubber tubing of the same caliber by means of a glass connection, which is 25 mm. in length and 4 mm. in diameter. The wound is irrigated by means of a glass reservoir suspended above the bed and connected with the perforated tubes within the wound by a rubber tube and intervening glass cannula. Several varieties of cannulæ are required, according to the number of tubes employed in irrigating the wound. The reservoir should have a capacity of one liter, and should be fixed at a height of one meter above the level of the bed. The dependent outlet should have a diameter of 7 mm., and to this is attached a rubber tube of 7 mm. diameter and 1½ or 2 meters in length. The latter tube is connected by means of a glass cannula to the perforated tubes in contact with the wound surfaces. When only one perforated tube is necessary the connecting cannula should be conical, 2 to

3 cm. in length, the interior diameter of the ends being 7 mm. and 3 to 4 mm. respectively. When two tubes for lavage are needed, or if irrigation through both ends of a single perforated tube is desired, the cannula should be Y-shaped. In the case of large wounds three to six perforated tubes may have to be provided for, and special glass cannulæ are needed; for example, in a case requiring four tubes the cannula should be 6 to 7 cm. in length and the lumen 7 mm. in diameter; the distal end of the cannula is closed; from one side of the cannula four branch connections project at right angles, so that the cannula has the appearance of a comb; the lateral connections should be 2 cm. long, and have a diameter of 3 to 4 mm., so that they can be fitted to the perforated tubes. A small metal clip is applied to the rubber tube which descends from the reservoir; the flow of antiseptic can thus be interrupted or liberated as required.

As it is important to bring the antiseptic in intimate contact with the wound, the perforated tubes must be carefully arranged on the wound surface without any intervening dressings.

When the wound is situated on the anterior aspect of the body, and practically horizontal, the arrangement of the tubes is comparatively easy. If the wound is inclined the tube should be placed along the upper border so that the solution will flow over its surface by the action of gravity. One or more perforated tubes with the ends closed may be used, or, as mentioned above, a single tube with perforations in the middle portion may be employed in the form of a ring by attaching the ends to a Y-shaped cannula. The latter arrangement is useful in cases of septic stump after amputation; the shape of the loop thus formed may be modified, according to the shape of the wound, by tying together the limbs of the loop with a thread. The tubes should be kept fixed in position by a strip of plaster at the edge of the wound and by gauze swabs soaked in Dakin's solution applied on the top of the tubes over the surface of the wound.

In the case of perforated wounds with two openings the antiseptic is readily brought into contact if the axis of the wound is horizontal, but if the line of the wound is more or less vertical it is advisable to cover the tube with a layer of gauze, otherwise the antiseptic will escape too rapidly from the lower opening and the wound will not be sufficiently bathed.

When a wound presents a single orifice the method to be adopted will depend on the position of the opening. If this is above, a tube with a single comparatively large opening near its end is inserted to the depths of the wound; the cavity of the wound will then be easily filled with the antiseptic and a rapid sterilization is favored, provided that there is room for the fluid to escape, when a fresh irrigation is made. If the orifice is dependent it is necessary either to surround a perforated tube with gauze, in order to maintain contact, or to employ simple perforated tubes and to inject the fluid under increased pressure. The facility with which the fluid drains off in cases like the above militates against a rapid improvement, such as can be expected when stagnation is more readily obtained. When the orifice is on the lateral aspect of the body a certain amount of stagnation can be achieved by the pressure of gauze swabs placed over the opening of the wound, and by altering the position of the patient.

Similarly in the case of large wounds with several orifices, the solution tends to escape too rapidly by the lowest-placed openings. Tubes perforated for 10 or 15 cm. should be introduced into all the recesses of the wound and as deeply as possible. In order to keep the tubes pressed against the soft parts gauze compresses should be placed in the center of the wound.

After arranging the tubes in the desired position gauze swabs soaked in Dakin's solution should be placed on the surface of the wound. These help to maintain the position of the tubes. It is necessary to insure that the perforated parts of the tubes are within the limits of the wound, as otherwise the antiseptic solution would

escape over the skin and be wasted and possibly harmful. The non-perforated parts of the tubes should extend for at least 15 cm. beyond the wound.

The skin surrounding the wound can be effectively protected from irritation by the hypochlorite solution by application of lint sterilized in vaselin. This is especially valuable in protecting the skin of the back and the posterior surfaces of the limbs.

The dressing recommended by Carrel is partly composed of absorbent, and partly of non-absorbent, cotton-wool arranged in two layers and covered on the surfaces by layers of gauze. The dressing is applied so that gauze and a layer of absorbent wool is next the wound surface. The non-absorbent gauze prevents the solution from escaping on the surface but does not prevent evaporation. No oiled silk or water-proof tissue is used.

The dressing is wrapped round the limb and fixed with safety-pins, no bandage being necessary; the wound can readily be exposed without disturbing the patient. Special openings can be made in the dressings so that the tubes can conveniently enter the wound, and when several tubes are required they can be connected to the reservoir by means of a branched cannula, as already described. The dressings should be renewed every twenty-four hours, but if there is much soakage the outer coverings can be shifted without disturbing the position of the tubes at any time. The mattress should be protected by a water-proof sheet; but this is only a precautionary measure, as the irrigation should never be so free as to damp the bed.

Intermittent irrigation of the wound is to be preferred in most cases to continuous, because where there are several openings in a large wound the fluid is apt to run out if the flow is continuous.

The routine method is to irrigate the wound once every two hours. This can be done in a large number of cases with little trouble by the nurse, who has simply to release the clip on the outflow tube for a few seconds. The pressure within the tubes causes the fluid to escape in jets from the perforations. The quantity thus injected varies from 20 to 100 Cc., and when properly done there should be no inundation of the patient or of the bed. The amount of fluid required for a single case in the twenty-four hours will vary from 250 to 1200 Cc., according to the extent of the wound.

After the wound has become aseptic it can be closed by suture or by adhesive plaster. Before deciding on closure the number of organisms must have steadily diminished, and for three consecutive days should have disappeared from the discharge. Secondary suture can usually be performed from the eighth to the eleventh day.

THE PHENOMENA OF ANAPHYLAXIS.

WYARD (*Lancet*, Jan. 20, 1917) regards this topic as timely because of the extended use at the present time of prophylactic and therapeutic injections of antisera. Anaphylaxis has been recognized since the work of Rosenau and Anderson in 1907, but is usually of little importance clinically on account of the minute quantities of bacterial protein used for vaccination purposes—amounts insufficient to make a toxogenic dose. In the case of diphtheria antitoxin the matter is quite otherwise and is of considerable moment, since there have been many cases reported of severe illness after injection of this serum, some ending fatally. Moreover, it has a direct bearing upon the prophylactic injections against tetanus, these being given to every man wounded in battle, and it is deemed desirable to give later prophylactic doses, or, symptoms of tetanus being manifest, larger therapeutic doses. The medical officer must decide as to the possibility of anaphylaxis following, and either trust to luck that no ill effects are produced or take antianaphylactic measures.

There is no satisfactory definition of anaphylaxis. The condition may be provisionally described as an increased sensitiveness of the animal organism to a foreign protein, so that injections of the latter in amounts which are innocuous to controls

produce in the hypersensitive animals symptoms of varying intensity and even acute death. Such a state of hypersusceptibility may be idiopathic to the individual in a few rare cases, while in others sensitization may be accidentally effected in ways which are only now coming under suspicion. The term is usually employed to denote the acute shock seen in animal experiments, the serum disease of man, and some diagnostic reactions such as those with tuberculin, mallein, etc. Anaphylaxis may be effected by any protein substance. In conformity with the general terminology of immunity these substances are called antigens. Moreover, all antigens are protein in nature, and it is almost conclusively proved that no body other than protein is capable of acting as an antigen.

The amount of protein required by the first dose varies within wide limits, sensitization having been effected by extremely minute quantities, even as small as 0.000001 Cc., and there is apparently no limit in the other direction so long as it be not in itself incompatible with the life of the animal. The second or toxic dose may likewise vary indefinitely upwards, but the minimal dose is at least 100 to 1000 times larger than that for sensitization, and is for guinea-pigs some 4 to 5 Cc. These figures refer to such antigens as possess no inherent toxic properties. The hypersensitive state does not supervene immediately upon the sensitizing injection. The average time for a moderate sized dose is from twelve to fourteen days. After a massive first dose sensitization may be more or less delayed.

The sensitizing dose may reach the physiological interior of the body by any method. Thus it has been shown that protein fed to animals in large quantities is later demonstrable in the blood. Later gastric and pancreatic digestion will so alter the constitution of such substances that no sensitization is possible except in abnormal circumstances where the processes of digestion are interfered with, when it appears that unaltered protein may pass into the large gut, be there absorbed to some extent, and so sensitize the animal. In the case of toxogenic dose greater variability prevails, and antigen administered by the mouth or per rectum never produces anaphylactic shock, for which purpose parenteral injection must be employed. The most certain methods are intracerebral and intravenous injections, next intramuscular, then intraperitoneal, intrapleural and subcutaneous, and finally intrathecal. The intracerebral route seems less suitable for sensitization than the other routes; but if the toxogenic dose be given in this way, the shock appears sooner and in greater intensity than in other circumstances.

The anaphylactic reaction resembles all other immunity reactions in its specificity—*i.e.*, specificity is not absolute. There is a suggestion that all antigens give rise to the same poison. A non-specific antianaphylactic (refractory period) may be produced in the hypersensitive animal with peptone. The same animal may be at one and the same time sensitized to a number of different antigens.

The essential features of anaphylaxis are shock, very sudden onset, increased respiratory rhythm, marked muscular weakness and irregularity and labored respiration, and death in convulsions or coma. Urine and feces are often involuntarily discharged —this in laboratory experiments. It appears to be due to a toxic substance in the elaboration of which the liver plays some part and its action is probably not central, but peripheral, upon the nerve endings or the muscles themselves. In dogs the effects are practically limited to the vascular system, and the action of the vasomotor nerve endings causing a paralysis. The precipitins are supposed to be a prime factor in the production of the condition. A transference may take place by means of the placental circulation and not by the milk. The condition may endure for many years.

Closely allied to, if not identical with, the phenomena described above is the serum disease of man, which may assume either of three forms. The first to be described is that occurring after a single large dose of serum, and symptoms appear eight to twelve days after the injection; the commonest

being urticaria, often involving a large part of the surface area, sometimes practically all. Other rashes—morbilliform or erythematous—are sometimes, but more rarely, seen. At the same time joint pains are common, and there may be swelling and tenderness of the lymphatic nodes associated with the site of injection. Some pyrexia and occasionally slight albuminuria may be associated. The symptoms pass off in from twelve to forty-eight hours. The second form is the accelerated reaction; it appears four to eight days after the second injection, and does not occur after a first injection. The symptoms are similar to those just described, but are more acute, and generally pass off within twelve to eighteen hours. As a rule neither of these forms is of serious import, but now and then may be very severe or even fatal.

The third form is an immediate reaction and is the same as that seen in experimental animals. The symptoms supervene within a very short time of the second injection. It is interesting to note that man is less susceptible to anaphylaxis than guinea-pigs, and more so than mice. The symptoms produced in man approximate closely those seen in guinea-pigs, and the pathology is probably essentially the same in both cases —*i.e.*, an extreme contraction of the bronchioles so that no air can enter the alveoli. There may be in addition hemorrhages. The symptoms usually come on in half an hour. First, local pain and tenderness, and the site of injection becomes swollen, red, and hot. The swelling may be very marked, and where the upper arm is used may extend from shoulder to wrist. Irritation with an intense desire to scratch the part may be a prominent symptom. The systemic phenomena may be intense without any or all such local changes. Suppuration never occurs and the part becomes normal within twenty-four to forty-eight hours. Almost at once the patient complains of difficulty in breathing, the chest becomes expanded and almost rigid, inspiration is particularly impeded, the face may become swollen and congested, the mucous membranes cyanosed. Auscultation shows the normal vesicular breath sounds replaced by a high-pitched bronchovesicular murmur. Moist sounds are not heard. Extreme urticaria may be seen at the same time. In cases slightly less severe the patient will sit up laboring for breath and racked by a frequent, almost continuous or paroxysmal, dry cough. Relief comes as suddenly as the onset, and in fifteen to thirty minutes the patient is to all appearances normal.

Friedberger has found that blood of an animal showing symptoms of anaphylaxis possesses no, or very little, complement, but that the condition is not due merely to lack of complement.

Complement is able to form from antigen a toxic body which, injected into a normal animal, gives rise to all the phenomena of anaphylactic shock.

On general principles it may be asserted that any one who has received one or more injections more than fourteen days previously is sensitized. A massive first dose does not cause antianaphylaxis, nor does the administration of lecithin. Starvation is efficient, at least in laboratory work.

Hypersensitive animals deprived of all food and allowed only water for four to five days are at the end of that period refractory to a second dose of antigen.

Vaccination against anaphylaxis may be employed by the injection of small doses of antigen during the incubation period, but to be effective these must be given late in the period, about the seventh, eighth, or ninth day, and have no such protective action if administered early—*i.e.*, about the third, fourth, or fifth day. If 5 to 10 Cc. of the antigen be given into the rectum, this having been thoroughly cleansed out, the individual is rendered refractory from ten to twelve hours later, and further subcutaneous injections may be carried out with impunity. The antigen is very slowly absorbed when given by this route, which is probably the reason for the subsequent desensitization, it having been found that if the antigen be administered subcutaneously in such a manner as to insure an extremely slow entry—*e.g.*, after the fashion of a subcutaneous saline infusion—very

large amounts may be tolerated, which if given rapidly in the usual way would certainly cause death. Both these methods are inconvenient and time-consuming. In considering the phenomena of hypersusceptibility it is seen that the effective toxogenic dose is very considerably greater than the sensitizing—that there is a definite minimum below which the antigen fails to elicit anaphylactic shock. This fact is made use of, for by the injection of such a subminimal dose the individual is thereafter rendered refractory for a time, during which further and even large doses may be safely given.

In man sensitization rarely if ever reaches such intensity as to cause reaction with 1 Cc. of blood serum, so that in the use of diphtheria or tetanus antitoxin, if it be considered unsafe to inject a large dose at once, 0.5 to 1.0 Cc. may be used as a preliminary injection, followed five or six hours later by any further dose that may be considered necessary. Should even greater rapidity be desirable, such a preliminary dose may be followed in five or ten minutes by a larger and every five minutes or so afterward by steadily increasing amounts, whereby in a very short time enormous doses may be given and without risk of anaphylactic shock. In the case of tetanus antitoxin where prophylactic doses are given, these are practically all innocuous. The amount of serum actually employed varies from 3 to 5 Cc., according to the concentration of the sample. An interval of anything up to five weeks between two such doses will never give rise to symptoms. About the sixth week, however, hypersensitiveness may appear. These remarks do not, of course, refer to those patients who have received previous massive injections—*e.g.,* for declared tetanus—or who require subsequent massive injections for therapeutic purposes. In such circumstances every precaution must be taken as indicated above.

It is obvious that nothing can be done to guard against the reaction after a first injection, as the individual gives no indication of his increased sensitiveness.

If the foregoing facts be borne in mind and the proper steps taken to avoid anaphylactic shock, there should rarely be any call for the treatment of that condition. Should it arise, however, every effort must, of course, be made to afford immediate relief. In mild cases the attack may be over before treatment can be applied; if more severe the exhibition of certain drugs may prove of service, such as atropine, adrenalin, chloral hydrate, and pure oxygen. In using either of the first two substances, subcutaneous injection is far too slow a method; they must be given intramuscularly or intravenously. In cases of still greater severity artificial respiration may be necessary and may alone succeed in tiding the patient over the period of shock, but is better used in association with one or other of the above-mentioned drugs. In a few instances of the utmost gravity no efforts will be of avail, and death ensues.

As regards the local signs, treatment is rarely called for. Much pain and swelling find relief in a hot fomentation, while irritation is allayed by moistening the surface of the part with 1-in-60 solution of carbolic acid.

SPONTANEOUS OR NON-TRAUMATIC RUPTURE OF THE LEFT KIDNEY.

THOMAS (*The Journal-Lancet,* Feb. 1, 1917) states that a number of such cases have been reported following severe muscular strain, some having hematoma and some perinephric tumor. A few were operated on, and Herzog found sixteen cases of spontaneous and one open injury to the kidney in 7805 autopsies. Watson operated on a case of ruptured hydronephrosis, which occurred in a woman when attempting to pull down a window.

Many cases of rupture and bleeding due to chronic nephritis have been reported. Wade reports a case of rupture occurring in a luetic who also had malaria. This individual was treated with mercury, which was thought to be the cause of the acute swelling and final rupture of the kidney. At autopsy an acute nephritis with rupture of both kidneys through their fibrous capsule was found. Speese collected 21 cases and

believes the underlying cause is a chronic nephritis. He holds that spontaneous rupture is probably due to chronic nephritis.

Wade holds that spontaneous rupture may occur in acute parenchymatous nephritis due solely to the extent and rapidity of the swelling of the organ. It may occur with or without perirenal hemorrhage of sufficient degree to present symptoms.

Thomas states that he has seen many cases with symptoms of acute pain after heavy lifting, etc., sometimes followed by tumor-formation or hematuria, or both. If the patients are confined to bed without surgical interference, many of these cases clear up. He has been unable to find a proved case of spontaneous rupture in a healthy kidney. The mode of production of these lesions after slight muscular strain is not clear. A case is reported which emphasizes the following points: A rupture of a pathological kidney may occur without trauma. A functionless kidney may frequently not cause symptoms when the other kidney is sound. Formation of stones in a kidney may be symptomless. Nephrectomy seems the only treatment possible in this type of case. The patient should be closely watched, and the time of operation should be carefully selected. Spontaneous rupture of a kidney probably does not occur without antecedent pathological change.

FRACTURES OF THE EXTERNAL CONDYLE OF THE HUMERUS IN CHILDHOOD, WITH ROTATION OF THE CONDYLAR FRAGMENT.

STONE (*Boston Medical and Surgical Journal,* Feb. 1, 1917) observes operative interference in fractures of the elbow-joint in children is ordinarily of very little benefit. There is, however, a perfectly definite type of fracture, or rather epiphyseal separation, of the external condyle of the humerus, which practically invariably demands prompt open reposition of the fragment. The cases are those in which the epiphyseal fragment has become rotated in such a way that the slightly cup-shaped fracture surface faces outward. It can be felt just beneath the skin unless there is unusual swelling, and can be recognized readily by the clean-cut edges and the slightly depressed center. The rounded joint surface lies more or less in contact with the epiphyseal line or fracture surface of the shaft, or with the outer anterior surface of the bone just above the fracture surface. There is a space between the shaft of the humerus and the head of the radius, where the epiphyseal fragment normally belongs, which is filled with blood-clot.

The periosteum is often torn off from the outer side of the shaft for a little distance upward, but may remain attached to the outer border of the rotated epiphyseal fragment. Under these conditions the torn-off periosteum may be more or less stretched across the fracture surface of the fragment. The displaced fragment may often be readily moved about, and may sometimes be pushed inward more or less into the gap from which it came, but in most instances it is impossible by manipulation to rotate the fragment back into place so that the fracture surfaces lie in contact. The fragment has rotated beyond a dead center and is locked there.

What happens if it remains in its abnormal position? New bone grows down from the fracture surface of the lower end of the shaft toward the joint, more or less filling in the gap left by the displacement of the fragment. This callus growing downward comes in contact with the synovial surface of the rotated fragment. Thus bony union is unlikely. New bone also grows out from the fracture surface of the fragment, which, as already stated, is pointing outward and upward. The callus growing out in a sort of groping manner does not meet the shaft at all. It finds no solid bone to which it may unite the fragment. Some callus may grow from the separated periosteum at the outer side of the shaft, which may thus make a bone bridge to unite fragment and shaft, or the union between the two may remain fibrous. Under these conditions the fragment becomes a roughly rounded projecting mass, more or less firmly united to the shaft, and

mechanically obstructing the free movement of the joint.

The treatment demanded early after one of these fractures has occurred is open incision, exposure of the fragment, removal of the clot and any fibrous tissue which may occupy the space from which the fragment came, and then with a blunt dissector the prying of the fragment into place in its normal position. The procedure is simple, but the force needed to rotate the fragment back into place when everything is in sight shows how useless are prolonged attempts at reduction by manipulation.

The open reduction should be done within the first few hours, or else after a sufficient interval for the swelling and ecchymosis to have subsided.

It is possible to restore the fragment to its normal position even after an interval of two months, although such a delay is never advisable. In that time much new bone will have formed both below the fracture of the shaft and from the fracture surface of the fragment. But this new bone at first will be found to be very soft and easily wiped away with a curette. The cavity from which the fragment came and the fragment itself may be restored to their original shapes and placed in their normal relations.

After an interval of more than two months, however, it will be impossible to differentiate between the old bone and the new. Adaptive changes in the shapes of the bones will have occurred. The problem will no longer be one of restoring a displaced fragment to the place from which it came, but will be one of securing the best possible functional result under abnormal conditions. The treatment must, of course, be determined by the conditions in each case, but as a rule the excision of the enlarged and useless fragment will give better results than any plastic bone repair.

The after-treatment of the early cases is simple. No suture of any sort need be put in the bone. Usually it is impossible to stitch the periosteum. There is no tendency to displacement once the fragment is replaced. Acute flexion locks the fragment in place. Stitches in the fascia and skin hold everything securely. These are usually inserted while the elbow is held flexed. It is much easier under these conditions to adjust the edges of the skin wound if the incision has been made L-shaped rather than curved.

Acute flexion may be maintained for a fortnight. The arm may then be put in an internal angular splint and later in a sling. Normal motion is promptly restored unless prevented by meddlesome passive motion.

THE APPLICATION OF THE MEDIAN PATELLA INCISION FOR A KNEE ARTHROTOMY.

BRACKETT (*Boston Medical and Surgical Journal,* Feb. 1, 1917) says that the median patellar route to the knee-joint is indicated in those conditions demanding an exploration of the anterior chamber of the joint, as well as for the removal of definitely loose bodies, not permanently located, for osteochondritis dissecans, and for the repair of crucial ligaments. It is an incision of considerable magnitude, but under proper precautions, and with the necessary care, it is a safe procedure, to be used when there is real reason for its use. It is not followed by a reaction proportionate to its apparent radicalism, as a rule, no more than in the usual arthrotomy. The operation is facilitated very considerably by attention to a few details of technique, and since this route is comparatively new it may be of value for those who have used it to some extent, to record their experience in regard to these details.

The incision must be long, particularly above, where it must extend to above the upper border of the lower third of the thigh, and below to beyond the tubercle of the tibia. Above the incision should slant distinctly to the outside, to follow the line of direction of the tendon of the quadriceps. The dissection of the tissues overlying the tendons need be carried laterally only far enough to disclose the edges of both the quadriceps and patella tendons. This much is necessary to insure a median division of these tendons, which otherwise is not easy.

The periosteum of the patella is cut through, but not retracted, and extended into but not through the quadriceps and patella tendons sufficiently to mark the line of incision. The patella is split by a saw cut, a little to the inside of the middle line, to leave the outside fragment a little larger than the inner, and to aid still further in this the saw cut may be slanted inward, to make the under side of the outer fragment wider than the upper. This also gives firm apposition in closing, as the tension of the tendon crowds the overhanging inner fragment down on the outer. This is not easy except with a small and fine saw, and the tendons must be first split; otherwise they will be frayed by this procedure. Ordinarily the straight cut is sufficient and often better. The saw cut is most easily begun with the knee in the extended position, and when the groove is well made, completed with the knee flexed at 45 degrees or more, in which position it is held firmly in place. The patellar tendon can be split by a single cut, but with the quadriceps it is necessary to divide it in layers, particularly in its upper part, as the fibers here are placed in a kind of spiral arrangement, the under fibers having a direction toward the inside, and the outer toward the outside, and this separation is carried on horizontally.

The alar ligaments and subpatellar fat pad are divided directly in the middle line, with the knee flexed, taking care to preserve the attachment of the ligamentum mucosum, which will usually be found on the inner half. By this median division the fat pad, with its synovial covering, can be brought together again, and leaves no raw surface exposed to the inner surface of the joint. It frequently is necessary to detach the alar ligament and the pad from the middle of the anterior surface of the tibia, to which it is only lightly attached. For a good view of the crucial ligaments it is necessary, and particularly so, to find and remove a cartilage. This is easily stitched back to the place of its old attachment and apparently does no harm. This is, however, not a good approach for cartilage, and is unnecessarily extensive.

Sterilized absorbent cotton wet in normal salt solution is preferable for sponging, for all possible friction to the synovial membrane is to be avoided. The author has used silk for all parts of the closure: Nos. 6 to 8 for the synovial membrane, quadriceps pouch, and both edges of the tendons; No. 14 for the patellar suture—one on either edge, above and below, taking in a bit of the tendon, which gives a firm, strong hold; and one or two between, taking in the periosteum and expansion of the tendon of the quadriceps. It apparently is not necessary to sew through the patella to insure good apposition, for the tension of the tendon is sufficient to keep the fragments firmly together. Fixation is not used, except by posterior Cotton splint, which keeps the knee from full extension, and gives sufficient protection, yet allows a little motion, which is desirable. When leaving the bed, the patient wears a split plaster, which is used during the time of being up for a month or six weeks; passive motion is allowed from the first, and given after two weeks, but never to beyond the point of pain. Weight-bearing in the plaster is allowed in a month, and full normal use expected at the end of two months.

TENDON REPAIR WITHOUT ACTUAL SUTURE.

STIELL (*The Practitioner*, December, 1916) in all treated 116 cases, those involved being extensor tendons anywhere between the dorsal expansion and the insertion of the tendon into the base of the ungual phalanx. In only two, both of which were complicated by suppuration, were there any signs of either mallet-finger or an impaired extensor function.

In following the treatment for accidental division of tendon without actual suture, it is essential that four important details should all be present at one and the same time; if any one of these details is absent, he acknowledges that it is decidedly risky to give a really hopeful prognosis either with or without actual suture.

It is of the utmost importance that the injured finger should be maintained in a position of hyperextension for at least three

weeks. This position should be brought about both at the metacarpophalangeal joint and again, if possible, at the ungual and interphalangeal joints. The method the author usually adopts to effect this position is by means of a simple flexible aluminum splint applied, for preference, to the palmar aspect of the hand and finger. In practice he finds that it is most convenient to fix the splint by means of two pieces of strapping, one of which he carries round the palm of the hand together with the splint, and the second piece round the splint and middle phalanx. By a little manipulation of the splint, before fixing it in position, it is possible in most cases to accomplish a right-angled hyperextension at the metacarpophalangeal joint with little or no discomfort to the patient. The ungual phalanx can now be slightly hyperextended by placing a pad of cotton-wool between the pulp of the finger and the splint.

It is necessary that the actual skin cut should have fairly close approximation of its edges, or, at least, the laceration must not be too extensive to render good apposition possible by means of skin stitches only. As a general rule, one finds that the position of the fingers, being in hyperextension, greatly relieves any tension on skin sutures, and, in fact, frequently abolishes this slight increase in the risk of sepsis entirely.

It is inadvisable to employ any form of drainage whatever for two reasons: first, because it tends to remove the very necessary and beneficial blood-clot from between the ends of the divided tendon; and secondly, that it only provides one more possible entrance for microörganisms. If there are early signs of suppuration when the patient first comes under treatment, or even if the wound becomes infected at a later date, then drainage becomes truly necessary. If this unfortunate complication does arise, the final functional result of the treatment will be equally disappointing, with or without actual suture of the tendon.

This is perhaps the most important factor in the treatment of "cut tendon," viz., that absolute asepsis is essential, or at least asepsis as regards the tendon sheath itelf. The author has frequently seen slight suppuration followed by a perfect functional result, but in those cases he was convinced that the sepsis was confined solely to the skin wound, and that the tendon sheath itself was uninvolved throughout.

TREATMENT OF BURNS BY AMBRINE.

At a recent meeting of the Société de Chirurgie, Professor Kirmisson showed several patients who had been burnt very severely and had been treated by Barthe de Sanfort with quite remarkable results. Other patients, treated in the same way by Michaux, showed equally good results. These were ail obtained with the use of ambrine, which was recommended by Barthe de Sanfort as long ago as 1904. He has had under his care, during the last two years, many cases of burns caused in warfare, and has found this preparation of great value. It is used chiefly for burns, but is equally suitable for other lesions, and especially for chilblains. It is a mixture of paraffin and resin, much resembling flexible collodion. It has an amber color and a resinous smell, solid consistence, and a density much the same as paraffin. It melts between 48° and 50° C., and then forms a syrupy fluid, which can be raised to a temperature of 125° C. without any alteration of its properties, so that its sterilization may be assured. It can be applied to wounds at a temperature of about 70° C. without causing the patient the least pain. It becomes solid below 45° C., and has the peculiar property of remaining for some time at a temperature of 40° C. An application will be found to be at about this temperature after being in place for twenty-four hours. It is therefore, in a way, a warm application, keeping the tissues at a raised temperature, which promotes the proliferation of the cells.

For use, a block of ambrine is broken into small pieces, which are placed in a suitable receptacle over a small fire. At 48° it melts, and the heat can then be raised gradually to 125°. The liquid is then poured into a basin and allowed to cool down to about 70°, at which temperature it is ready for

application. It can be sprayed from a spray-producer, or painted with a sterile brush over the whole surface of the wound, which has previously been washed with warm boiled water or normal saline. As the ambrine solidifies, it forms a thin skin over the surface of the wound. On this is placed a very thin layer of sterilized absorbent wool, and a further thin layer of ambrine is spread over this. The part is then covered with a few layers of gauze or wool and a bandage. It is not necessary that these should be sterilized, for the wound is quite sealed up. The dressing is simple, painless, and cheap, but a more important point is that it altogether relieves the pain in the burn. It is left in place for twenty-four hours, sometimes for forty-eight. After taking off the bandage and gauze, the whole skin is removed in one piece without causing the slightest pain, for there are no adhesions to the wound. In the case of burns, the wound is found covered with a thick, purulent exudation, often smelling very disagreeably. This is removed by gently sweeping off with swabs soaked in boiled water or normal saline. The surface of the wound must be quite dry before the ambrine is applied. A current of hot air is the best method, but sterile gauze answers nearly as well, if applied very gently.

There are no contraindications for the use of this method. Burns of the third degree, with extensive destruction of tissues, heal up very well. The length of treatment required depends on the general condition, on the extent of the lesion, and on the amount of tissue destroyed. A burn on the face of the second or third degree is usually healed in twenty-one days. An extensive burn on the arm will take nearly the same time.—*Journ. de Méd. et de Chir. prat.*, Nov. 10, 1916 (quoted by *The Practitioner*, January, 1917).

REVIEWS.

BOTANIC DRUGS: THEIR MATERIA MEDICA, PHARMACOLOGY, AND THERAPEUTICS. By Thomas S. Blair, M.D. The Therapeutic Drugs Publishing Company, Cincinnati, Ohio, 1917. Price $2.00.

The design of this book is to emphasize the view that physicians should more largely resort to the employment of drugs which are derived from the vegetable kingdom and less to synthetic remedies, most of which have their origin in the laboratories of German chemists. There is no doubt that it has been the fashion during the last twenty years to turn to the newer synthetic products and not to pay sufficient attention to what are called amongst pharmacologists galenical preparations. This is in part due to the fact that many of the synthetics possess properties which galenical preparations do not possess, that they are put up in agreeable and convenient form, or can be so compounded, whereas in the use of fluid extracts or tinctures made from plants a certain amount of inert matter is usually included, and this inert material gives the dose an evil taste.

The intention of the author is not to inveigh against the employment of alkaloids, which represent the active principles of crude vegetable drugs, but rather to insist upon further study of the sources from which they come. He points out that failure to get good results from some vegetable drugs is due to their method of collection or preservation. Thus, in the case of cactus, he asserts that if the plant is dried before a pharmaceutical preparation is made from it, it is inert, whereas if the pharmacist prepares his drug from the fresh plant, it possesses distinct physiologic property. Possibly this is the explanation of the diverse opinions which have been reached by practitioners who have employed cactus.

The book contains a little less than four hundred pages and mentions, of course, many drugs which are comparatively little used by practitioners to-day. Some of them are commonly employed by so-called eclectics and homeopathists. Many of them have been dropped from the more recent editions of the Pharmacopœia, and some of them have been dropped from the National Formulary.

The author well points out that pharmacology tells us the probabilities regarding a drug and what its line of possible utility may be, in distinction from the clinical investigations, which may not be surrounded by as many scientific boundaries or limitations, but which, nevertheless, provide most of the indications that we follow in the administration of medicine. As a book designed to call renewed attention to the drugs which are derived from the vegetable kingdom, this one is timely and will perform a useful function.

CANCER: ITS CAUSE AND TREATMENT. By L. Duncan Bulkley, A.M., M.D. Paul B. Hoebner, New York, 1917. Price $1.50.

The readers of the GAZETTE will recall the fact that two years ago Dr. Bulkley put forth a small book in which cancer was considered from quite a different angle from that commonly held by the profession and laity. He also on more than one occasion has made contributions to the pages of the GAZETTE.

The present volume is composed of a series of lectures arranged in the form of six chapters. It concludes with a summary which the author has entitled "The Real Cancer Problem." He considers the mortality from cancer and the influence of sex, age, occupation, etc., upon its occurrence; but the chief burden of his theme is with the influence of food upon this disease and with the conditions of the blood. For this reason he devotes the fifth chapter to the dietetic and medical treatment of cancer prophylaxis, and in his sixth chapter gives the results which he has obtained in carrying out his ideas.

It will be recalled that the underlying basis of Dr. Bulkley's position may be described in his own words to the effect that the real cancer problem relates to placing the patient in such a normal or ideal state of life that the function of nutrition is performed in exactly the proper manner. He regards animal proteins as a fertile cause of the derangement of metabolism which leads up to and forces the growth of cancer, and believes that it has somewhat the same relation to cancer as heavy wines have to gout. For this reason he is an advocate of an absolute vegetable diet as a means of combating the development of cancer.

His advice in regard to the directions to be given to patients who have developed cancer is excellent, but his statement that it is not always necessary to operate for cancer, that the *x*-rays and radium are often of value, and that the disease can also disappear and remain absent under careful and efficient dietetic and medical treatment is very questionable advice, if handed to a layman. The exact value of the *x*-rays and radium is to be determined. While they prove very valuable in certain superficial epitheliomata, they generally fail in deep-seated growths. So, too, we do not think that the profession is yet ready to embrace the thought that the dietetic treatment of cancer consists in an absolutely vegetable diet. Those who doubt the position taken by Dr. Bulkley in regard to this important matter should, however, recall the fact that he has had a very large and long experience with cancerous growths, and that his enthusiasm in the study of these grave conditions has led him to devote an amount of time and energy to their investigation which deserves much credit.

PULMONARY TUBERCULOSIS. A Handbook for Students. By Edward O. Otis, M.D. W. M. Leonard, Boston, 1917. Price $1.75.

Dr. Otis, who is Professor of Pulmonary Diseases and Climatology in the Tufts College Medical School, Boston, has written a manual of two hundred and twenty pages with sixteen full-page illustrations to present the views which he holds as a result of having studied pulmonary tuberculosis for many years. Each chapter begins with a verse or sentence, from some poet or writer, which is believed by the author of the book to be appropriate. Altogether there are fourteen chapters.

After a discussion of the anatomy and physiology of the respiratory passages, the history of tuberculosis, the pathology and bacteriology of the disease, Dr. Otis devotes two chapters to diagnosis, one to

prognosis, and one to treatment. Of course, he emphasizes the value of outdoor treatment and sanatorium treatment, the usefulness of proper feeding, the limitations which should be put upon exercise, proper clothing, and the administration of various agents of remedial nature. He speaks cautiously of the value of tuberculin and recognizes its limitation. So, too, he is cautious in regard to the general recommendation of the production of pneumothorax. For the relief of cough he thinks well of heroin and dionin. Nitroglycerin is recognized as a useful remedy in hemoptysis, but nothing is said of the fact that chloroform can also be used if nitroglycerin or amyl nitrite is not at hand.

The closing chapters of the book deal with tuberculosis in children, the use of climate in the treatment of tuberculosis, prophylaxis, marriage, and reports of cases which the author considers interesting or valuable. In the chapter on Tuberculosis in Children, practically nothing is said of the very interesting question as to whether the primary infection takes place through the respiratory or alimentary tract, but the fact is recognized that many cases of tuberculosis which develop in later life are the result of an infection which took place during childhood.

INTERNAL SECRETIONS: THEIR PHYSIOLOGY AND APPLICATION TO PATHOLOGY. By E. Gley, M.D. Translated from the French by Maurice Fishberg, M.D. Paul B. Hoebner, New York, 1917. Price $2.00.

There are few subjects of greater interest to medical men in every branch of their profession than that of the endocrine glands, and Professor Gley has prepared the text of this volume in order to bring together in readable form an immense amount of literature which can be put to more or less practical use. The translator, who is already well known for his work in connection with tuberculosis, has not endeavored to make a literal translation, but has borne in mind the need of expressing the real meaning of the author.

There are five chapters in the volume, which begins with an introduction describing the differences between the two kinds of secretions, next a brief historical summary of the subject, and, after this, the distinctive characteristics of the internal secretory glands and the principal products of their activities. After this there is a classification of the internal secretory glands and the products which they secrete, and, lastly, a description of the functions of these glands with a consideration of the reciprocal actions between them, a subject which is rapidly being understood as of great importance. The book closes with a consideration of the diseased function of these glands, including hypersecretion, hyposecretion, and trophic deviations. A very considerable amount of literature is referred to under copious foot-notes. As the book contains less than 250 pages of large type, well spaced, it is one which can be readily gone over in a comparatively brief space of time, and, it goes without saying, provides a large amount of interesting physiological and clinical matter.

CASE HISTORIES IN OBSTETRICS. By Robert L. De Normandie, A.B., M.D. Second Edition. W. M. Leonard, Boston, 1917. Price $4.00.

The first edition of this book appeared in 1914, and at that time received our favorable recommendation. The method is the reporting of cases which are supposed to be typical, and the author states that the histories are all records from actual patients. By means of these illustrative cases the author has successfully attempted to represent the various conditions which are met with in obstetric practice, dividing his text into twenty-eight sections, the first dealing with Diagnosis of Pregnancy and the last with The Management of the Baby. Most of the minor and serious complications of pregnancy and labor are therefore included. A section is devoted to "The Morphine and Scopolamine Method." The author states that the furor which passed over this country a year or two ago in regard to "twilight sleep" has to a certain extent died down, but that some patients still demand it. He thinks that the risk of an untrained man using "twilight sleep" is greater than the

risk of this man doing a moderately good forceps delivery. He points out the difficulty in obtaining a good preparation of scopolamine, and says that in his experience the motor excitement is sometimes tremendous, necessitating several nurses to hold the patient in restraint, and that no one can foretell which patient will manifest these symptoms. Finally he states that in his opinion "twilight sleep" has a small place in obstetrics, and that for the general run of cases he is confident that other means of analgesia are much more satisfactory. These views seem to be in accord with the majority of obstetricians at the present time.

Concerning eclampsia, the author points out that many writers have advised delivery in eclamptic patients by Cæsarian section. His belief is that this is permissible in a few well-picked cases, when it should be recognized that any operative procedure carries added risk to the patient already dangerously ill. For postpartum eclampsia he recommends free bleeding. In one case 25 ounces were withdrawn with a fall in blood-pressure from 165 to 110. He also advocates, combined with eliminative treatment, the giving of morphine hypodermically in sufficient amounts to bring the respiration to at least ten per minute. The diet should be limited to milk, and, in his opinion, "eclamptic babies" should be given a teaspoonful of castor oil shortly after birth to aid them in eliminating poisons. He does not believe that the infant should be allowed to nurse the eclamptic mother.

THE STARVATION TREATMENT OF DIABETES, WITH A SERIES OF GRADUATED DIETS. By Lewis Webb Hill, M.D., and Rena S. Eckman. Third Edition. W. M. Leonard, Boston, 1917.

We learn from the publisher's note which accompanies this book that the present third edition represents the twentieth thousand. There has been a general revision and increase of sixteen pages. The diet lists have been rewritten, as have also the recipes, which are increased in number.

It will be recalled that the object of this little book, when it first appeared in 1915, was to provide a working manual for practicing physicians who wished to institute the so-called Allen method of treating diabetes, a method which undoubtedly gives excellent results in a large number of cases, and which is markedly opposed to some of the views which were generally held as to the danger of starvation in diabetes before Allen's original publication appeared. Those who wish an exhaustive discussion of this subject will doubtless desire to purchase Joslin's book, which is much larger and more complete, but for the ordinary hurried practitioner this little volume of less than 150 pages has already proved, and will continue to prove, a very handy manual.

An innovation in the present edition is the addition of a table containing the analyses of various proprietary and other food preparations made by the Connecticut Agricultural Experiment Station, and which the publisher states are authoritative and will be useful in guiding practitioners who may be called upon to advise patients as to the actual value of many commercial products, some of which contain so large a percentage of starch as not to lend themselves to the starvation treatment of this disease as illustrated by the text of the book.

REST, SUGGESTION, AND OTHER THERAPEUTIC MEASURES IN NERVOUS AND MENTAL DISEASES. By Francis X. Dercum, A.M., M.D., Ph.D. Second Edition. P. Blakiston's Son & Co., Philadelphia, 1917. Price $3.50.

This volume is only in one sense a second edition, since the text was first prepared as an article upon these subjects in the System of Physiological Therapeutics edited by Dr. S. Solis Cohen some years ago, it forming Volume VIII of that System. Opportunity has been taken to carefully revise and rewrite some of the chapters and to bring the text up to date. As would be supposed from its title, much importance is attached to rest, proper feeding, and psychotherapy. Careful attention is given to the difficult subject of the interpretation of neuroses and the importance of distinguishing between simple neurasthenia or fatigue neurosis and psychasthenia, with lines of differ-

entiation between these conditions and hysteria and hypochondria. The third part of the volume deals with suggestive therapeutics, and details are given in regard to this matter, pointing out the value of suggestion, direct and indirect, and the conditions in which it proves most useful.

The last part of the book deals with suggestions by mystic and religious methods, hypnotism, etc., and is largely historical in its dealing with pythonism, magnetism, mesmerism, hypnotism, Perkin's tractors, faith cure, and Eddyism. Points of importance are emphasized by printing them in heavy type. Careful advice is given in regard to the treatment of young persons who come of a neurotic ancestry, or who, still more unfortunately, may be thought to inherit mental instability. One of the important characteristics of the book is the very conservative and sane attitude of the author toward questions concerning which certain persons within recent years have seemed to run wild. The general practitioner is sometimes tempted to think that a certain class of neurologists are almost as far off the track as many of the patients who consult them. Several years ago we heard a well-known physician ask to be shown a normal neurologist; if any physician is still searching for such a *rara avis* he will find him in the author of this book.

TEXT-BOOK OF OPHTHALMOLOGY. By Hofrat Ernst Fuchs. Translation from the twelfth German edition. Completely revised and reset, with numerous additions specially supplied by the author and otherwise much enlarged, by Alexander Duane, M.D., Surgeon Emeritus, Knapp Memorial Hospital, New York. With four hundred and sixty-two illustrations. Fifth Edition. J. B. Lippincott Company, Philadelphia. Price $7.

Fuchs's Text-book of Ophthalmology for many years has been the standard work in this department of medicine and surgery, and it was a happy circumstance when nine years ago the first English edition, translated and edited by Dr. Duane, came into the possession of ophthalmologists in English-speaking countries. The present or fifth edition is indeed a new work, for no new German edition has been issued, and the translator and editor has with liberal hand, wise judgment, and characteristic excellence supplied the necessary additions and made the needed alterations. In point of fact, this fifth English edition is far superior to any of the German editions, and contains so much of value from the pen of Dr. Duane that his name might well appear, not merely as an editor and translator, but as a joint author in the book. He gracefully acknowledges Fuchs's liberality in granting permission for the additions which he has made, and also for the notes which he himself has supplied for many of these additions. The most important new matter is contained in the chapters on glaucoma, diseases of the retina, disturbances of motility, and in the sections devoted to refraction, accommodation, and the descriptions of operations.

The reviewer has nothing but praise for this book, which for more than a quarter of a century has commended itself to ophthalmologists all over the world, reflecting as it does the vast experience of Hofrat Fuchs in clinical observation and pathological work, and reflecting, too, in the American edition, the knowledge and experience of Dr. Duane, his many original observations, and his scholarly attainments.

G. E. DE S.

DISEASES OF THE STOMACH, INTESTINES AND PANCREAS. By Robert Coleman Kemp, M.D. Third Edition, Revised. Copiously Illustrated. W. B. Saunders Company, Philadelphia, 1917. Price $7.00.

Dr. Kemp's book now covers ten hundred and ninety-six pages and contains four hundred and thirty-eight illustrations. The first edition appeared in 1910. In the present edition the great value of the *x*-ray as an aid to diagnosis of the gastrointestinal tract has received much attention. Many of the radiographs are from the author's own cases. There is a chapter upon Lane's kink, Jackson's membrane, duodenal dilatation, and the relaxed ileocecal valve.

We are interested to note that the author's attitude in regard to Lane's investigations and operations is distinctly conservative. The readers of the GAZETTE

will recall that we have already in our editorial columns pointed out that such measures are justifiable only under very rare conditions, and with this opinion we are glad to note that the author is in accord. Dr. Kemp also attempts to correct erroneous ideas concerning autointoxication by dealing with intestinal putrefaction and by inserting a section on subinfection and protein absorption. Much care is taken to indicate medical measures and treatment as well as methods of diagnostic investigation. The author does well to insist upon the view that gastrointestinal neuroses are extremely rare, and that in a large majority of instances such conditions will be ultimately found to depend in reality upon organic lesions which have failed to be properly investigated or discovered.

DISEASES OF THE GENITO-URINARY ORGANS AND THE KIDNEYS. By Robert Holmes Greene, A.M., M.D., and Harlow Brooks, M.D. Fourth Edition, Thoroughly Revised. W. B. Saunders Company, Philadelphia, 1917. Price $5.50.

This is a composite book written by a surgeon and a medical clinician. During the last seven years it has passed into four editions, and it is manifest, therefore, that it has been useful to those who have been fortunate enough to purchase it. The aim of the authors has been to devote equal attention to the medical and surgical aspects of the diseases discussed. There are thirty chapters which deal with the methods of examination, both surgical and medical, in diseases of the genito-urinary tract and the therapeutic procedures which should be resorted to, whether they be medical or surgical. It is evident, therefore, that the authors have had a large field to cover, and they have done this successfully. The book is well illustrated, with a complete index. The spacing between the lines is wide, the type clear, and while the paper is unnecessarily heavy, all these facts tend to make the volume easy for reading. The illustrations, too, are practically useful and aid materially in indicating to the reader how various methods of procedure should be resorted to. Both of the authors are well and favorably known for their activities in these two branches of clinical work, and the book is a credit to them and the medical profession in this country.

A COMPEND OF HUMAN PHYSIOLOGY. Especially Adapted for the Use of Medical Students. By Albert P. Brubaker, A.M., M.D. P. Blakiston's Son & Co., Philadelphia, 1917. Price $1.25.

More than thirty years ago, if we remember correctly, the first edition of Dr. Brubaker's Quiz-Compend upon Physiology made its appearance. By careful revision and editing he has kept it within approximately the same bounds as it originally possessed. Always popular with students, there is every reason to believe that in its present form its popularity will be maintained. As with all books of this character, it is not intended by the author to be used to the exclusion of the larger manuals, notably the Text-book on Physiology by Dr. Brubaker, but rather as a goad with which the student may brush up and find out the subjects which he should study in larger manuals in order to have competent knowledge of this important matter, a study which medical students are all too prone to ignore during their student days, but which they appreciate the importance of with every year that goes by in after practical life, for the medical man who does not know, and have at his finger-tips, the fundamental principles of physiology cannot hope to understand the processes of disease or the effects of drugs upon both normal and abnormal organs.

STATE BOARD QUESTIONS AND ANSWERS. By R. Max Goepp, M.D. Fourth Edition, Thoroughly Revised. W. B. Saunders Company, Philadelphia, 1917. Price $4.25.

The fact that every physician who wishes to begin practice has got to go before some State Board of Medical Examiners, and nearly always feels the need of some helpful preparation for such an examination, produces a definite need for a volume of this character. The first edition appeared in 1908, and it and the other editions have been reprinted a number of times. In the present edition, which covers no less than

seven hundred and twenty-four pages, and which is illustrated when necessary, an immense number of questions and answers in all the departments of medicine which State Boards cover are given and competent answers appended. New laboratory tests which are now commonly employed as to disease of the kidney and disturbances of metabolism have been introduced, as have also serological tests and various functional tests. A number of questions which heretofore have not been given but which seem to have become popular with State Board Examiners are also introduced.

The amount of work expended by the author in the preparation of this volume must have been very great, and his ability to put in brief and compact form all the information which is desired is to be highly commended. Many physicians who are not going before the State Boards will find in these pages an immense amount of information which will be useful to them as practitioners as well as laboratory workers.

DISEASES OF CHILDREN. A Manual for Students and Practitioners. By George M. Tuttle, M.D., and Phelps G. Hurford, M.D. Third Edition, Thoroughly Revised and Enlarged. Illustrated. Lea & Febiger, Philadelphia, 1917.

The first two editions of this book were prepared by Dr. Tuttle, and in the preparation of the third edition he has called to his assistance Dr. Hurford. Dr. Tuttle tells us in the Preface that the greater burden of the revision has fallen upon the latter. The book is not one of the large exhaustive monographs upon pediatrics, covering a little less than six hundred pages. It is emphatically a practitioners' manual without bibliographic references, and written in much the same style as a teacher would prepare text for an individual student or fellow practitioner. In one sense it may be called a book on the practice of medicine limited to children below the period of adolescence. There are nineteen chapters in the book which deal with the development of the child, feeding, and the diseases of various organs, as well as infectious diseases, and diseases of obscure origin.

DISEASES OF THE STOMACH. A Text-book for Practitioners and Students. By Max Einhorn, M.D. Sixth Revised and Enlarged Edition. William Wood & Company, Philadelphia, 1917. Price $4.00.

Dr. Einhorn has been known to American medical men for many years as an earnest pioneer student of diseases of the digestive apparatus. The fact that his book, dealing with such a special subject, has reached its sixth edition within a comparatively short time emphasizes its value. He not only gives his own views and methods, but all the important articles are accompanied by bibliographic references which show that in preparing the text he has carefully gone over the literature and so is familiar with the work done by other clinicians and investigators in this country and in Europe. When necessity arises he illustrates his meaning by describing patients that he has personally seen and examined. The book is printed in such large type and such wide spacing that it covers nearly six hundred pages, but this adds materially to the ease with which it can be read. It is freely illustrated, and the sixth edition is, like most later editions, a distinct improvement on earlier ones.

EYE, EAR, NOSE, AND THROAT. A Manual for Students and Practitioners. By Howard Charles Ballenger, M.D., and A. G. Wippern, M.D. New Second Edition, Thoroughly Revised. Freely Illustrated. Lea & Febiger, Philadelphia, 1917. Price $3.50.

In the compiling of the text of this volume, which covers about five hundred pages, Dr. Ballenger considers Diseases of the Nose, Throat, and Ear, and Dr. Wippern is responsible for the section upon the Eye and its Affections. The book is not designed as an exhaustive treatise upon these subjects; on the contrary, it is much more in its scope a résumé or compend than an exhaustive book. No literature is quoted, but commonly accepted facts on the part of specialists in diseases of the organs named in its title are expressed. Methods of operation are shown by illustrations which are excellent, but the question naturally arises as to whether it is proper for the general practitioner to undertake radical operations upon the frontal sinus and the

ethmoid region without special training over a long period of time. Certain it is that operations on these parts are not devoid of danger even when they are performed by well-trained and conservative operators. The text of this volume, while clear and definite, so far as operations are concerned, is therefore better suited to inform the student and physician what should be done by those who are trained and skilful than it is to lead him to the belief that he is competent to resort to such surgical interference, a very proper qualification.

PRINCIPLES OF PHARMACY. By Henry V. Arny, Ph.G., Ph.D., F.C.S. Second Edition, Revised. W. B. Saunders Company, Philadelphia, 1917. Price $5.50.

When Dr. Arny's first edition appeared we pointed out its many advantages. This first edition appeared eight years ago, and a considerable amount of new material has been gotten together and introduced into the pages of the present edition—the more so as, since the appearance of the first edition, the new Pharmacopœia has gone into effect and the fourth edition of the National Formulary has appeared. Although the author has used every endeavor to keep the book within bounds, it now covers more than a thousand pages. It is designed, of course, chiefly for the pharmacist and undergraduate medical student who is taking a course in pharmacy. To those physicians who still prepare and dispense their own drugs it can be cordially commended.

AN INDEX OF DIFFERENTIAL DIAGNOSIS OF MAIN SYMPTOMS. By Various Writers. Edited by Herbert French, M.A., M.D., Oxon., F.R.C.P. London. Illustrated in Black and White and in Colors. William Wood & Company, New York, 1917. Price $10.00.

This book is a single volume system of diagnosis, the companion volume to another one issued in 1907 and entitled "Index of Treatment." Twenty-three well-known English physicians contribute to its pages, the largest number of articles, however, being contributed by the editor, Dr. French, whose communications cover almost every department of medicine. Some of the authors, on the other hand, contribute only one or two articles, as, for example, Cammidge, on Pancreatic Reaction; Coombs, on Irregular Pulse; Fletcher, on Headache and Vomiting; Gilford, on Dwarfism. The illustrations are remarkably good. This holds true especially in connection with the colored illustrations, which in other books often are remarkably bad. The book contains an immense amount of valuable information, as it is closely leaded, the pages wide, and the type is not overly large, but, nevertheless, quite large enough to make its reading easy. No attempt is made to arrange the text according to symptomatology. The articles appear, as they would in an encyclopedia, in alphabetical order. Practically every one of the contributors is a man who has already made his mark in medicine, and, therefore, what is said is written of authority. The volume is a notable contribution to modern medicine and will doubtless prove interesting and of great value to the active practitioner who consults its pages.

THE PRACTICAL MEDICINE SERIES. Under the General Editorial Charge of Charles L. Mix, A.M., M.D. Obstetrics, Edited by J. B. De Lee, A.M., M.D. With the Collaboration of H. M. Stowe, M.D. The Yearbook Publishers. Series 1916. Chicago. Price $1.35.

This individual one, of an always welcome series, representing as it does a summation of current literature, takes up Pregnancy, Labor, the Puerperium, the New-born, and Obstetrics in general. Under these headings will be found excerpts and reviews of the most valuable papers of last year upon such subjects as Physiology, Toxemia, Eclampsia, Abortion, Painless Labor, Twilight Sleep, Placenta Prævia, Puerperal Sepsis, the Diseases and Accidents affecting the New-born, and Infection; moreover, such interesting topics as, for instance, shall more than one finger be employed in vaginal examination? At times these books are compiled without a large sense of proportion or a clear concept of what the profession really wants. Such a criticism cannot hold in regard to the present volume.

NOTES AND QUERIES.

DELIVERY THROUGH SHELL WOUND.

The *British Medical Journal* of February 17, 1917, abstracts an article by Saint, Goelinger, and Poiré (*Journ. de Méd. et de Chir. Prat.*, Jan. 10, 1917) in which they record the case of a woman six months pregnant in whom delivery was brought about by a remarkable accident. She lived in a region occupied by the British and constantly bombarded, and was sitting at a window when a shell exploded in the street and wounded her in the lower abdomen. When brought to the hospital it was found that the belly was very painful and palpation was so difficult that it was impossible to determine the position of the fetus. An aperture of entry was found a little below and to the left of the umbilicus, and that of exit at a distance of nine centimeters from the left crural arch. On palpation it was found that the abdominal muscles were completely divided and that only a bridge of skin was left between the two apertures. The patient was bleeding abundantly through the vagina. The bridge of skin was cut through and laparotomy was performed. On the fundus there was found a wound of about five centimeters through which was seen the lumbar region of the fetus showing a small wound. The wound was enlarged, when the fetus was easily delivered; the pelvis, which was full of meconium and amniotic fluid, was cleaned, and the operation was completed by careful hemostasis and suture of the uterus. The case ran a normal course and the mother made a rapid recovery. As for the child, which was left unattended to as it was believed to be dead, it soon began to cry and to show itself very much alive. It weighed 950 grammes; but as no incubator was available it died in fifteen hours. The authors believe this is the first case of the kind in the present war.

[We may recall, however, that in the *British Medical Journal* of December 4, 1915, it was stated that Dr. Henrot had not long before given to the Paris Académie de Médecine an account of the bombardment of the hospital at Rheims. The maternity patients were by way of precaution moved to the cellars. One of the women was delivered by the action of a shell, which tore open the abdomen and uterus; the child had simply to be extracted. This may, of course, be the same case as the one reported by Saint, Goelinger, and Poiré, but as Henrot speaks of a "fine child" having been presented to him, while in their case the child was premature and died in a few hours, it seems more probable that there have been two war accidents of the same kind.]

CORRESPONDENCE.

APOMORPHINE AS AN ANTIDOTE TO STRYCHNINE.

To the Editor of the THERAPEUTIC GAZETTE.

SIR: I would be pleased to know if there is any literature on strychnine poisoning treated with apomorphine? I do not remember ever seeing anything in print. Recently I had a case that took nearly two grains by mouth. I saw him in about one hour afterward and he was having very severe convulsions. Before I arrived they had given him at least one quart of sweet milk. I administered apomorphine grain one-tenth, expecting to empty his stomach, but did not, and repeated the dose in five minutes. It made him slightly sick and he tried to vomit, but could not as the spasm would come on in the attempt. After the second dose I soon noticed abatement of spasms, and in one and one-half hours they had disappeared entirely. The patient administered the same amount to a large dog the day before, and the dog died in about an hour or so.

I have made inquiry of Dr. Robertson, a veterinary surgeon, and he states that he has treated twelve cases of strychnine poisoning with apomorphine. All of them were having marked convulsions, but he has only lost two cases out of the twelve. He states they usually vomit, and the convulsions cease in a short time afterward. He also states that a large dose is required, about one-fifth grain. In my case I was only able to produce very slight emesis. I would like to know if apomorphine is a physiological antidote.

H. P. SHELTON.

GEORGETOWN, OHIO.